Agriculture, Natural Resources and Rural Enterprise
Office of Sustainable Development
Bureau for Africa
U.S. Agency for International Development

Comparative Economic Advantage of Alternative Agricultural Production Options in Swaziland

Glenn T. Magagula and Hamid H. M. Faki
Center for Agricultural Research and Policy Analysis
University of Swaziland, Luyengo

Technical Paper No. 103
December 1999

Publication services provided by **The Mitchell Group, Inc. (TMG)**
pursuant to the following USAID contract:
AFR/SD Support Services Contract Number AOT-C-00-99-00224-00

Contents

Foreword

Southern Africa was characterized by a heavily regulated agricultural market before the late 1980s but, since then, countries in the region have followed a strategy to remove restrictive measures from the agriculture sector. The deregulation process has taken place within the context of worldwide liberalization of agriculture. These changes have meant that Swaziland, and the entire southern African region, has to compete internationally in a more open agricultural market. In order to be competitive, southern African countries have to use resources more efficiently by exploiting their comparative advantages. Policy decision-makers should be guided so as to implement policies and strategies that will enhance the competitiveness of agricultural producers.

Various studies have shown that countries can improve their welfare by opening up their borders to freer trade. Furthermore, there is a worldwide move toward economic integration, the European Union being the most prominent example. Southern Africa is no exception with the region's move toward a Free Trade Area under the auspices of the Southern African Development Community (SADC). Not only is it foreseen that this movement will improve welfare in the whole region, but the region's competitiveness could also improve. Within the framework of economic integration in southern Africa, countries will only reap benefits by exploiting comparative advantages that exist within the region.

Swaziland is one of seven countries in SADC participating in the Research Program on Regional Agricultural Trade and Changing Comparative Advantage in Southern Africa. The comparative economic analysis (CEA) study in Swaziland, therefore, forms part of a larger activity to determine comparative advantages in the region. These studies not only examine the existing comparative advantages, but also provide a means to evaluate the impact of different agricultural policies on comparative advantage. This proves to be an especially valuable tool to guide policymakers in the region.

The comparative economic analysis revealed that Swaziland has a high and fairly stable competitiveness in sugar cane, pineapple, grapefruit and cotton. With regard to the SwaziNationLand (SNL), the study found that maize is important for subsistence and food security, there are low returns for family labor, and there is a potential for both mechanization and mixed cropping. The authors, therefore, recommend several policy options including importing maize, boosting maize yields, maintaining cotton production, and/or stabilizing groundnut yields. The study also found that title deed farms or Individual Tenure Farms (ITF) are competitive in most crops, excluding maize. Both sugar cane and cotton are highly stable crops and pineapple also shows considerable stability while vegetable crops show high variability

The findings of the study, and their implications, have also been specified according to highveld, middleveld, and lowveld. In the highveld, there is competition between vegetables and maize. While the comparative advantage of vegetables depends on further exploitation of irrigation possibilities, the expansion of maize depends on yield improvement. There is competition for land and water between rainfed and irrigated crops in the middleveld. Pineapple and vegetables are the priorities in this area, but maize has a better potential here than in the highveld. Finally, in the lowveld sugar cane, fruits, and irrigated cotton are competitive. While sugar cane and citrus fruits are competitive in irrigated areas, priority should be given to cotton for rainfed cultivation.

This study is one in a series of studies on Africa's regional trade and comparative advantage, a joint activity of USAID Africa Bureau's Food Security and Productivity Unit in the Office of Sustainable Development, Agriculture, Natural Resources and Rural Enterprise Division and the Regional Economic Development Services Office for Eastern and Southern Africa (REDSO/ESA).

Dennis Weller, Chief
Agriculture, Natural Resources and Rural Enterprise
Office of Sustainable Development
Bureau for Africa
U.S. Agency for International Development

Dennis McCarthy, Chief
Office of Agriculture, Engineering, and Environment
Regional Economic Development Support Office,
Eastern and Southern Africa
U.S. Agency for International Development

Acknowledgements

Many invaluable contributions made to this study are highly acknowledged. The advice of Prof. Rashid Hassan, Univeristy of Pretoria, was instrumental in the foundation of the study design and his assistance has been crucial in geo-referencing and alliance of socioeconomic data and geographical maps, as well as in providing constructive comments on the study. Data collection on the Swazi Nation Land was lead by Prof. A. Okorie and Ms. P. Magagula. Ms. Magagula also contributed to the surveys on Individual Tenure Farms. Further, the contribution of Dr. S.L. Ndlovu to determine coordinates of the sampled farms through the GPS are highly appreciated. The cooperation of farmers and managers in the traditional and private agricultural sectors in providing information was central in the conduct of the study. Last but not least, the financial support of the USAID through UNISWA/CARPA was momentous in the realization of the study.

This study was made possible through support provided by the Regional Economic Development Support Office for Eastern and Southern Africa (REDSO/ESR) and AFR/ARTS/FARA/FSP, U.S. Agency for International Development under the terms of grant No. 623-0478.23-A-00-4092-00. The opinions expressed herein are those of the authors and do not necessarily reflect the views of the U.S. Agency for International Development.

Dedication

Dedicated to the memory of the late Professor Glenn Themba Magagula, formerly Deputy Vice Chancellor of the University of Swaziland, whose vision, foresight and leadership led to the development and implementation of the "Regional Trade and Comparative Economic Advantage in Southern Africa" activity.

Executive Summary

Swaziland is one of seven countries in the Southern African Development Community (SADC) participating in the Research Program on Regional Agricultural Trade and Changing Comparative Advantage in Southern Africa. The objectives of the program are to investigate the impact of applying agricultural comparative economic advantage (CEA) on the drive for increased inter-regional trade and food security. The importance of the program stems from the legacy of state interventions in markets and protectionist attitudes that led to market distortions and inefficient use of national resources.

For this study, a team approach was adopted to allow for regional cooperation. Also, a unified methodology was followed to allow for regional analysis, to draw regional perspectives of the implications and to facilitate common dissemination procedures. Domestic resource cost analysis (DRC) was employed to estimate the CEA of crops in the major agroecological zones in each country. Geographical information systems (GIS) were employed to link geophysical and spatial factors.

In Swaziland, the six, identified agroecological zones were the basis for the collection and analysis of farm data. In addition, the two land tenure systems were taken into account when analyzing the sample further. Determinants of comparative advantage were identified as biophysical conditions, resource endowments, level of technology and production system, product and input prices, market and infrastructure and economic policy.

Results and Conclusions

The crops selected for analysis were maize, cotton, sugar cane, pineapple, grapefruit, oranges and cabbage. The comparative advantage and sensitivity analysis showed high and fairly stable competitiveness of sugar cane, pineapple, grapefruit and cotton. The comparative advantage of vegetables and oranges were restricted due to some variation in crop yields. Looking at the nominal protection coefficients (NPCs), which depict net policy intervention (in both input and product prices), there was limited intervention in maize (coefficients close to 1) while cotton was taxed and groundnuts enjoyed net subsidy in this sector.

These results call for measures that encourage expanded production of those crops that enjoy high comparative advantage. Options for their expansion will depend on their competition for domestic resources which vary with the natural and socioeconomic characteristics of the agro-ecological zones. Although maize was not one of the crops that has comparative advantage, it is vital for food security. This study found that with improved available technology maize was substantially competitive. Possible policy options to increase maize's comparative advantage include intensifying extension and research efforts to boost yields or grow maize only in those agroecological zones favorable to its production. In all cases, enhancement of production according to comparative advantage and relaxation of excessive market interventions will encourage efficient resource use, raise farmers' incomes and, thereby, improve food security.

For other crops, the options available for their expansion depend on many factors, including competition for domestic resources, variability and risks of yields and prices, opportunities for internal and external markets and the potential to boost crop yields. Policy interventions for the commercial sector may address manageable factors that reduce risk and encourage a movement from diversification to specialization to enhance efficiency in the use of national resources.

Glossary of Acronyms and Abbreviations

ACP	Africa, Caribbean and Pacific
ASU	Agricultural Survey Unit
CCU	Central Cooperative Union
CEA	comparative economic advantage
CIF	cost insurance and freight
CMA	Common Monetary Area
COMESA	Common Market for Eastern and Southern Africa
CSO	Central Statistics Office
CSS	Crop Storage Section
DRC	Domestic Resource Cost
EPC	Effective Protection Coefficient
ESRA	Economic and Social Reform Agenda
EU	European Union
FOB	free on board
GATT	General Agreement on Trade and Tariffs
GDP	Gross Domestic Product
GNP	Gross National Product
GPS	Global Positioning System
Ha	hectare
HV	Highveld
IMF	International Monetary Fund
ITF	The Individual Tenure Farms
LE	Eastern Lowveld
LM	Lower Middleveld
LR	Lubombo Range
LW	Western Lowveld
MEPD	Ministry of Economic Planning and Development
MOAC	Ministry of Agriculture and Cooperatives
MOU	SADC Memorandum of Understanding
Mt	metric tons
NAMBOARD	National Agricultural Marketing

NDS	National Development Strategy
NMC	National Maize Corporation
NPC	nominal protection coefficients
NPE	Net Policy Effects
PAM	Policy Analysis Matrix
PRC	Price Review Committee
RCR	Resource Cost Ratio
RCSA	Regional Center for Southern Africa
REDSO/ESA	Regional Economic Development Support Office for Eastern and Southern Africa
SACU	South African Customs Union
SADC	Southern African Development Community
SDB	Swaziland Dairy Board
SNL	The Swazi Nation Land
SSA	Swaziland Sugar Association
SWAKI	Swaziland Milling Company
UM	Upper Middleveld
USAID/AFR/SD/ANRE	U.S. Agency for International Development, Bureau for Africa, Office of Sustainable Development, Agriculture, Natural Resources and Rural Enterprises Division
WTO	World Trade Organization

1. Introduction

1.1 BRIEF OVERVIEW OF THE STUDY

This treatise serves as a contribution to the current regional trade study on the changing agricultural comparative advantage in southern Africa within an agroecological zonation framework. The regional trade agenda aims, among other things, to investigate the impact of applying the notion of agricultural comparative economic advantage (CEA) on the drive for increased inter-regional trade and food security. It is, therefore, a critical ingredient in the regional economic and political liberalization process which is creating new opportunities for stimulating inter-regional trade and for enabling trade to serve as a significant engine for economic change in the Southern African Development Community (SADC).

The study constitutes a major component of the Cooperative Agreement between the Regional Economic Development Support Office for Eastern and Southern Africa (REDSO/ESA) and the University of Swaziland. The Cooperative Agreement is jointly financed by REDSO/ESA, the Regional Center for Southern Africa (USAID/RCSA), and the Bureau for Africa, Office of Sustainable Development (USAID/AFR/SD/ANRE). Under this agreement, the University of Swaziland is mandated to coordinate the regional trade analytical agenda that focuses on determining CEA of agricultural production in member countries of SADC and its implications on inter-regional trade, investment, and food security. The project currently operates in seven of the twelve SADC countries; namely, Malawi, Mozambique, South Africa, Swaziland, Tanzania, Zambia, and Zimbabwe. It is envisaged that, given availability of resources, the study will be expanded to include some of the remaining countries in SADC.

As indicated earlier, the CEA study is based on an agroecological zonation framework. It is within this framework that the Swaziland study was undertaken and implemented. As will be described later, the six identified agro-ecological zones of Swaziland were used as a basis for the collection and analysis of farm data. In addition, the two land tenure systems found in Swaziland formed the basis for partitioning the sample frame.

The rationale for the study is firmly based on the confluence of views among countries of southern Africa that promoting the liberalization of trade flows in the region holds the greatest promise for enhancing the region’s growth potential and is, therefore, bound to serve as a powerful tool in the solution of macroeconomic problems currently facing the region. A commonly-shared perception among SADC member states is now emerging that regional integration, based on an export-led strategy and outward-oriented policies, is a crucial catalyst for attaining accelerated growth and for generating the most appropriate conditions for facilitating the desperately-needed economic renaissance of the region. Development of a single market in southern Africa is now viewed as a most urgent priority and a major ingredient for achieving not only the revitalization of the economies of SADC but also for ensuring the region’s global competitiveness. The regional trade analytical agenda is thus expected to provide a meaningful contribution to the on-going regional trade discourse and policy initiatives aimed at ensuring that expanded trade and investment become the new engine of growth for the region. Additionally, it is envisaged that the outcomes of this project will capture the imagination of policymakers, private-sector investors, and other stakeholders in the region and influence them to design policies and strategies that are compatible with effective and efficient resource use in agricultural production and enhanced inter-regional trade. Such a development will thus create a policy environment that is facilitative of trade to play a dynamic role in determining and guiding the pace of economic development in countries of the region.

Some of the initiatives, which are aimed at creating new opportunities for expanded inter-regional trade and the increased predilection of the region to global competitiveness, include the following:

- Active policy changes in a number of countries in southern Africa to come to grips with and redress the ubiquitous macroeconomic distortions created by decades of unsustainable state interventions and pursuance of policies that are detrimental to growth and development. The economic deterioration, resulting from poor policy-making and economic management, quite often reflected itself in increasing fiscal deficits, highly negative current account balances, overvalued exchange rates, high inflation, and rapidly declining gross domestic products. Consequently, a majority of the SADC countries is presently involved in painful "…structural adjustment programs, often at the behest of the World Bank and IMF, and often in a climate of crisis…"[1] These measures include, inter alia, policy reforms aimed at enhanced macroeconomic stability, a transformed role of the state, provision of an environment that enhances and capitalizes on the dynamism of the private sector, and creation of policy instruments that are geared towards providing a remedy to all impediments to growth. Policies for an expansion of trade and investment constitute a major component of the initiatives to address these challenges and to give rise to long-term sustainable economic transformation in the region. For the SADC countries to arrive at appropriate remedies for their ailing economies, it is crucial that workable models and policy options to move the structural adjustment programs forward be designed and made available to those who are engaged in policy implementation. The endeavors of the SADC countries to reform their economies, therefore, represent a tremendous challenge to policy analysts in the region to generate, through research, policy approaches that will ensure success of the reform initiatives and lead to positive shifts in economic growth and development of these countries. It is in this regard that the utility of the regional trade analytical agenda is focussed.

- The United States Government–SADC Memorandum of Understanding (MOU) of December 1995 in which RCSA is expected to assist SADC with analyses and research concerning trade, in general, and the creation of a regional free trade area, in particular. The regional trade studies are, therefore, expected to play a major role in this regard.

- The Free Trade Protocol entered into by SADC member states in August 1996. Its major aim is to address policy issues that inhibit the emergence of integrated regional markets through, for instance, strategies such as trade liberalization and removal of impediments to cross-border trade and investment. The creation of a single market in SADC is perceived by all member countries as a powerful strategy for deepening trade opportunities among countries of the region. It is also viewed as a vehicle for enlarging the market on offer to both domestic and foreign investors and the emergence of a more competitive environment and a framework for increased exploitation of economies of scale. The regional trade analytical agenda is, therefore, expected to provide priority policy options aimed at facilitating the implementation of the protocol and the emergence of a sustainable trade and investment framework for the region.

The regional trade analytical agenda, therefore, comes at the most auspicious time in the socio-economic history of the region when countries of southern Africa have entered a new and challenging era in their efforts to achieve substantial political and economic transformation by taking advantage of opportunities of increased regional cooperation. As clearly articulated by Murkherjee and Robinson, "minority rule in South Africa ended with the first democratic elections in April 1994. More representative forms of government are also being adopted in other southern African countries. They are also seeking closer economic relations with the world economy, as well as with one another, under the Southern African Development Community (SADC)."[2] The observed political changes in the region, coupled with the increased demand for regional cooperation, are increasingly manifesting themselves in a collective desire for appropriate agricultural and trade policy reforms.

1.2 STUDY OBJECTIVES

[1] Merle Holden, "South Africa's Economic Reforms", in Gavin Maarsdorp, *Can South and Southern Africa Become Globally Competitive Economies?*, MacMillan Press Ltd., 1996, p. 221.
[2] Natasha Mukherjee and Sherman Robinson. S*outhern Africa: Economic Structure, Trade, and Regional Integration*. Trade and Macroeconomics Division, International Food Policy Research Institute, Washington D.C., October 1996, p. 5.

This study, as indicated above, is inspired by the regional initiatives that call for in-depth analysis of those policy issues that are meant to improve the agricultural competitiveness of countries in the SADC. The eminent importance that the economies of the region have placed on agriculture, the linkage that agriculture has with other sectors, and the strong ties that Swaziland is currently forging with regional and international markets, are some of the considerations that compel Swaziland to be concerned with the critical question of whether the performance of her agriculture is actually based on clear efficiency criteria. The drive to explore efficiency questions is supported by the vulnerability of the country's economy to external shocks, the observed trends towards sluggish economic growth rates and the virtually passive contribution of agriculture to national output in recent years. The study is, therefore, anchored on the premise that competitiveness and higher productivity must constitute the bedrock of the country's agricultural policy. In this respect, the major aim of the research analysis is to elaborate policy options that will ensure a smooth expansion path of Swaziland's agricultural sector and enhance the profitability and competitiveness of the country's agricultural production through promoting those activities in which the country has the greatest potential or comparative advantage. Also, it is intended that the study will help Swaziland create coherent economic, political, and social environments that will foster growth and promote enhanced international and regional trade and investment.

Given the possible market distortions caused by policy interventions in the agricultural sector, which may negatively influence the country's competitiveness in an economy open to world-market interactions, this study aims to evaluate the competitiveness of the country in producing key agricultural crops and to suggest policy options for enhancing trade with countries in the region. This is expected to have a major payoff, both in modulating policy debates and in influencing farmer responses.

In brief, therefore, this report is intended to bridge the knowledge hiatus regarding the economic efficiency of the country's agricultural sector. Furthermore, the study aims to provide policymakers, agricultural practitioners, and all other stakeholders with the necessary information and tools for judging the performance of the agricultural sector in Swaziland and for enabling them to develop an awareness of those areas of greatest economic potential in Swaziland agriculture.

On the basis of the above, the study, therefore, has the following specific objectives:

- To define the major agro-ecological zones of Swaziland and the agricultural sector's contribution to the country's macroeconomy.
- To trace along agro-ecological zones the comparative economic advantage that Swaziland has in the production of selected major crops.
- Draw inferences on agricultural policy and production decisions that may impair the country's ability to effectively compete regionally in the production of the various agricultural commodities that Swaziland produces.
- Develop policy and institutional reform options that will guide the country towards the desired ends of optimal use of domestic resources in agricultural production, improved producer response and removal of tariff and non-tariff barriers to increased inter-regional trade.

1.3 METHODOLOGY OUTLINE

Domestic resource cost (DRC) analysis was employed for deriving the CEA of the crops under investigation in various agro-ecological zones. Under this method, financial and social costs and returns of each crop are delineated and partitioned into tradable and non-tradable (domestic) components. The comparative advantage of a commodity is reflected by the level of efficiency of using domestic resources to produce that commodity. In other words, the lower the value of domestic resources that are needed to yield a unit of value-added (in tradables), the better is the comparative advantage of the commodity. The research methodology is more extensively explained in Chapter 3.

The analysis was carried out for the major crops grown in each agro-ecological zone, providing information on how commodity allocation among zones could be improved subject to the efficient utilization of domestic resources. Sensitivity analysis was carried out to trace the effect of changes in different variables on the CEA. The analyses were based on primary data collected through field surveys in the identified agro-ecological zones. Further, spatial variation in natural and socio-economic factors was recorded with geo-referencing through global positioning system (GPS) devices for each of the surveyed sites. This was useful in integrating spatial dimensions in the CEA analysis.

2. A Brief Overview of Agro-ecological Zones and the Agricultural Sector of Swaziland

2.1 GEOGRAPHIC LOCATION AND MAJOR AGRO-ECOLOGICAL ZONES OF SWAZILAND

The Kingdom of Swaziland is situated between South Africa on the North, South, South East, and West, and the Republic of Mozambique on the East, is a land-locked country. It lies approximately between latitudes 31° and 32°and longitude 26°and 28° east. At 17,364sqkm, Swaziland is the smallest country in the African continent; the Gambia being the smallest.

Topographically, Swaziland can be divided into six agro-ecological zones as follows: the Highveld (HV) the Upper Middleveld (UM), the Lower Middleveld (LM), the Western Lowveld, the Eastern Lowveld (LE), and the Lubombo Range (LR).[3] The Agro-ecological Zones of Swaziland run approximately in a parallel fashion to each other from North to South (See Table 2.1 and Map 2.1).

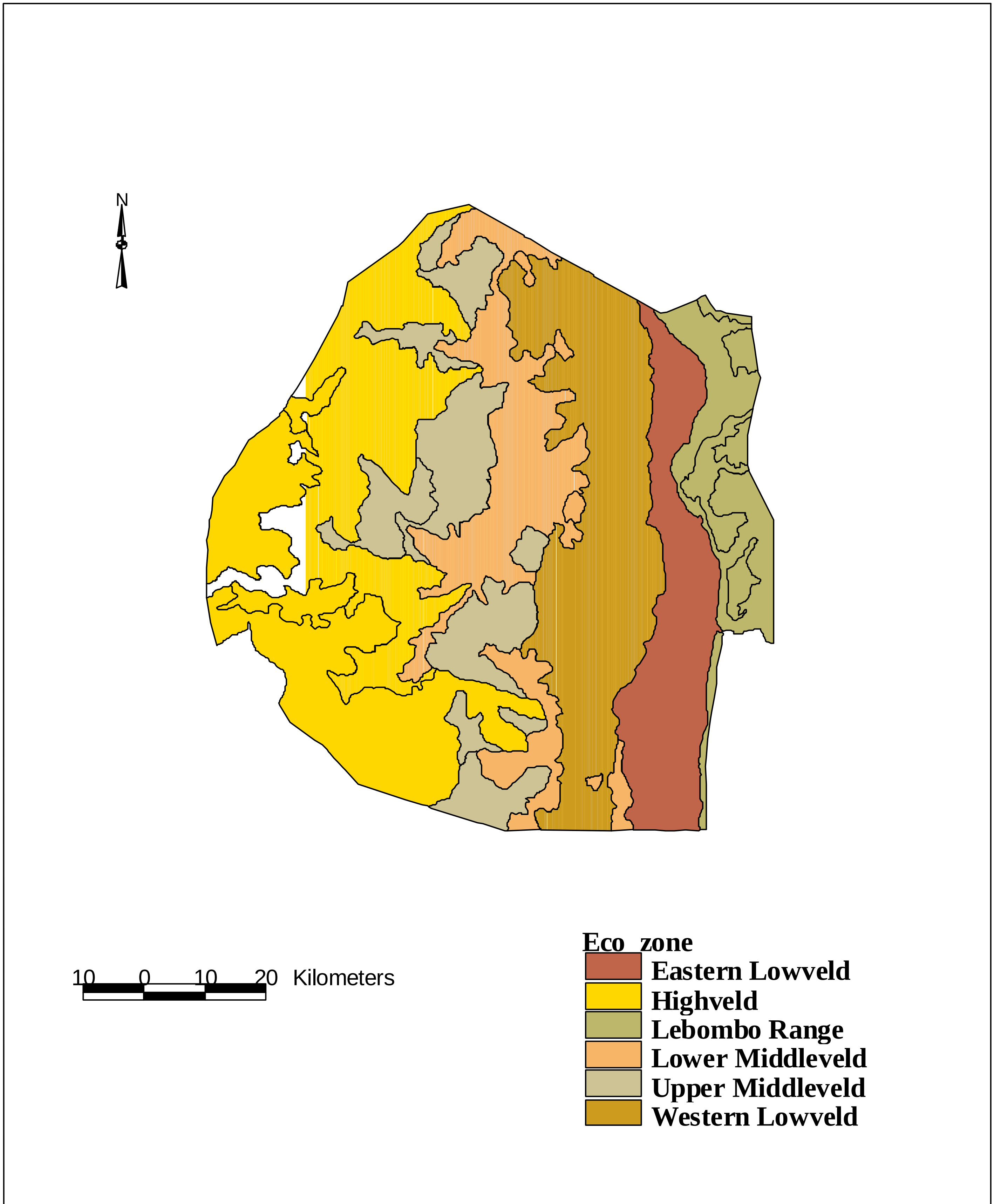
Table 2.1. Brief Attributes of Swaziland's Agro-ecological Zones

Zone (% Total Area)	Altitude (m) (min-max)	Annual Rainfall; 80% Reliability (mm)	Soils	Farm Activities
Highveld (33%)	900-1400 (600-1850)	1000-1200	Acidic, Low in N, P & Mn ; Erosion.	Cattle grazing; Small-scale farmers; Maize is the main crop.
Upper Middleveld (14%)	600-800 (400-1000)	850-1000	Deep clay loam.	Main agricultural zone; Crops: citrus, pineapple, cotton, maize.
Lower Middleveld (14%)	400-600 (250-800)	700-850	Sand and sandy loam.	Groundnut, beans vegetables.
Western Lowveld (20%)	250-400 (200-500)	450-550	Good to fair soils.	Crops: Sugar cane, cotton.
Eastern Lowveld (11%)	200-300 (200-500)	400-450	Vertisols.	Groundnut, sorghum.
Lubombo Range (8%)	250-600 (100-750)	550-700	Escarpment, Limited arable land (12%).	Main activities: Ranching, maize, cotton, minor crops.

Sources:
- Land Use Planning Section. *Agroecological Analysis of Swaziland: Part A.* Land Resources, Ministry of Agriculture and Cooperatives. Mbabane, p. 6.
- Land Use Planning Section. *Land Use Planning Handbook for Swaziland,* Ministry of Agriculture and Cooperatives, Mbabane, p. A2-2.
- Extractions from Edje, O.T. and M. Shongwe (1994). *"Potential and Constraints for Agricultural Research in Swaziland"*. In O.T. Edje and A.C. Smith (ed.) *Potential and Constraints for Research in Swaziland and Setting National Research Priorities. Proceedings of Workshops held at the University of Swaziland, Feb. 24th and May 11th, 1994.*
- Central Statistical Office, Swaziland. *Annual Statistical Bulletin*, Mbabane, Swaziland, 1994.

[3] Land Use Planning Section. *Agro-ecological Analysis of Swaziland*, Ministry of Agriculture & Cooperatives, Mbabane, Swaziland, 1994, pp. 3 and 6.

Map 2.1. Agroecological Zonation System of Swaziland



The main climatic and topographic characteristics of these zones play a significant role in determining the observed land use patterns of the country. It is worth mentioning that, though comparable to the Highveld and Lowveld in terms of total land area, the Middleveld represents a more important agricultural zone through its relatively higher crop yields and accommodation of the smallholder farms. In 1994/95, for instance, 40% of the crop-growing holdings were located in this zone as compared to 28 and 24% in the Highveld and Middleveld zones, respectively. The Lubombo Plateau, on the other hand, is located in only 8% of the total land area and had only 9% of the small-scale holdings in 1994/95. Table 2.1 provides highlights of the major features of these agro-ecological zones.

2.2 THE POLITICAL ECONOMY

Swaziland has a small, reasonably diversified and open economy that is vulnerable to exogenous economic shocks and influences. The country's economic development is closely aligned to that of South Africa through membership in the South African Customs Union (SACU)[4] (the world's oldest customs union agreement) and the Rand Common Monetary Area (CMA). Resulting from Swaziland's SACU membership, South Africa is Swaziland's most important trading partner and a major source of foreign direct investment.[5] For instance, South Africa accounts for roughly 80% and 30% of Swaziland's merchandise imports and exports, respectively. The close ties between the two economies and the dependence of Swaziland's economy on that of South Africa imply that Swaziland's prospects for a sustained economic transformation and macroeconomics stability are, of necessity, situated in the context of changes in the performance of the South Africa economy.

Though Swaziland is also an active member of the SADC and the Common Market for Eastern and Southern Africa (COMESA), the country's economic dependence on the total membership of these two organizations is heavily outweighed by the strength of its economic links with South Africa. For instance, while considerable trade between Swaziland and member states of these two organizations already exists, trade with South Africa accounts for roughly 70% of Swaziland's total trade with both SADC and COMESA countries. Nevertheless, the considerable changes which are afoot in both SACU, COMESA, SADC and the wider international environment are bound to have a momentous long-term influence on Swaziland's trade dynamics and macroeconomic environment through the provision of expanded opportunities for boosting the country's regional and international trade relations.

As indicated earlier, most countries in SADC are engaged in political and economic reform strategies, sponsored mainly by the World Bank and the International Monetary Fund (IMF) and aimed at both political democratization and emergence of an improved environment for economic recovery. These policy changes are beginning to have a significant revitalizing effect on the entire region and on Swaziland, in particular. In this regard, the spectacular political developments in South Africa and Mozambique, Swaziland's neighbors, are not only affecting the whole region but they are particularly showing signs of exerting a tremendous influence on political and economic developments in Swaziland. For instance, both countries (South Africa, in particular) are devoting a lot of effort in attracting foreign direct investment and this is having the effect of diverting some investment away from Swaziland. Swaziland is, therefore, now faced with the challenge of providing an investment climate that will effectively compete with her neighbors by both luring significant foreign direct investment into the country and retaining those private sector firms that disinvested from South Africa during the previous political regimes of that country. Obviously, "...the days of the mid to late 1980s when foreign investors (largely disinvesting from South Africa) came into the Swazi economy for the benefits that it offered, when growth was double digit, the government budget was running a significant surplus, and Swaziland looked like the optimal place to undertake business activities in support of a larger southern African market..."[6] are fading fast. Swaziland is now faced with the twin challenges of attracting foreign direct investment on a sustainable basis and ensuring the retention of investors who disinvested from South Africa into

[4] Note that over 50% of the country's revenue emanate from SACU receipts.

[5] Ministry of Economic Planning and Development. *Development Plan 1995/96 - 1997/98*, Mbabane, Swaziland, April 1995, p. 9.

[6] World Bank, *Swaziland Financial Sector Study*, Report No. 14985-SWA, Washington D.C., May 15, 1996, p. i.

Swaziland in the 1980s. The country now readily accepts that, for these twin objectives to be attained, stable macroeconomic management and peaceful political change are crucial to the process.

Given this situation, Swaziland has committed herself to a robust program of responsible macroeconomic management and other public policy reforms, private sector-led growth and general liberalization of the economic environment through approaches that are supportive of private sector activities. These aims are part of a Shadow Stabilization Program, prepared by the Swaziland Government with the assistance of the International Monetary Fund and the World Bank in 1994. This program is expected to be considerably boosted by the Prime Minister's Economic and Social Reform Agenda (ESRA), initiated in 1996, and the National Development Strategy (NDS) which is currently being designed by the Ministry of Economic Planning and Development (MEPD).

The most important features of the Swazi economy can be briefly defined as follows:

- It is essentially an agricultural economy, relying mainly on agro-forestry and manufacturing based on agricultural raw materials. The Swazi economy consists mainly of a dual system which includes a highly developed commercial sub-sector that is dominated by large-scale capital intensive, export-oriented enterprises and farms which have been developed using mostly foreign-sourced capital. The other system consists of a low productivity smallholder sub-sector, characterized by semi-subsistence and rain-fed production, communal grazing and high vulnerability to droughts and other changes in rainfall patterns.

- "Because of its proximity to South Africa and (relatively high) degree of labor mobility, formal sector wages in Swaziland are high relative to per capita GNP. This has important implications for resource allocation and public sector wage policy.

- "Given its structure, openness, and size, the economy is vulnerable to external shocks and subject to wide fluctuations. In particular, it is sensitive to developments in South Africa, e.g., trade, foreign investment flows and labor, as well as to changes in commodity markets, particularly for sugar, and climatic conditions".[7]

Swaziland's economy has been able to grow relatively fast over the past decade due to the country's fiscal circumspection, relatively free markets (albeit not so free in some aspects of the agricultural sector), and sustained improvements in the conditions for attracting direct foreign investment and for enabling increased growth in aggregate national output. According to latest estimates, the country's per capita GNP, at slightly over US$1,000, is the fifth highest in the SADC region (next to South Africa, Mauritius, Botswana, and Namibia),[8] even though the country accounts for less than half a percent of the region's population. Swaziland is, therefore, considered a middle-income country. However, a considerable slowing of the economy, a phenomenon that has become quite pronounced since 1990, is increasingly challenging this ranking. The slowdown in economic growth is attributable to factors such as decreasing foreign direct investment, declining world commodity prices (due to an adverse global economic environment), and drought.[9] Hence, the country's economy is now caught in the throes of high and accelerating budgetary deficits, reduced levels of economic activity (resulting in shrinkage of formal wage employment), and an increase in the number of people living in penury and deprivation.[10] There are indications, however, that the economy is beginning to show signs of recovery (Table 2.2 and Figure 2.1) and efforts are afoot, at both public and private sector levels, to ensure sustainability of this trend.

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[7] World Bank, *Swaziland Public Expenditure Review*, Report No. 11583-SW, Washington D.C., January 29, 1993, p. i.

[8] *The Europa World Year Book*, Vol. II Europa Publication Limited, Kazakhastan, 1994.

[9] Note that the growth rate was estimated at 2.5% in 1993-94 and this indicated a slight economic recovery from the drought of early 1990s. Nevertheless, this was still outpaced by the population growth rate of about 3.4% per annum. See, Ministry of Economic Planning & Development, *op. cit.*, April 1995.

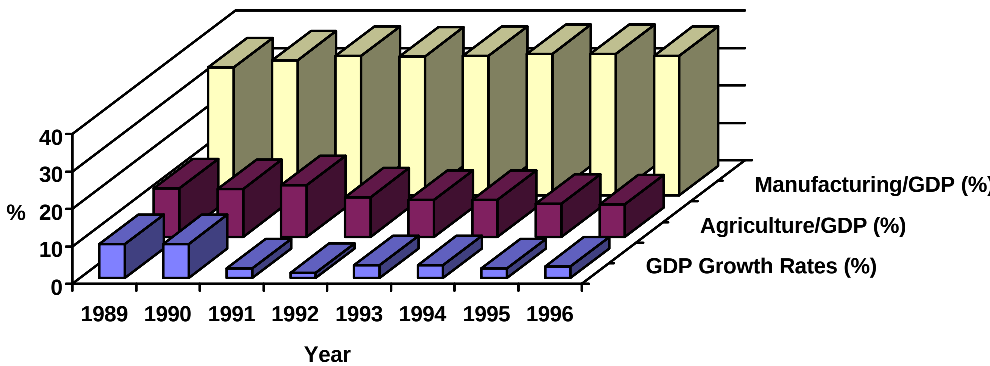
[10] UNDP, *Human Development Report*, Oxford University Press, New York 1994. According to this report, roughly 46% of the country's population lives below poverty line.

Table 2.2. GDP at Constant 1985 Prices

	1989	1990	1991	1992	1993	1994	1995	1996*
GDP Growth Rates (%)	9.1	9.1	2.5	1.3	3.4	3.4	2.5	3.0
Agriculture/GDP (%)	13.0	12.7	13.8	10.6	9.8	9.8	8.8	8.7
Manufacturing/GDP (%)	34.3	36.2	37.3	37.1	37.4	37.9	37.9	37.4

Source: Central Bank Of Swaziland*; Annual Report 1994/95, Annual Report 1995/96, and Annual Report 1996/97 (Draft)*, Mbabane, Swaziland, May 28, 1997, p. 8.
*Projections

Figure 2.1. Growth in GDP (%) and Contribution of Agriculture and Manufacturing (%)



Despite the likely recovery, nevertheless, recorded growth rates at 1985 factor cost continue to lag so far behind population growth rate (currently estimated at 3.4%) that it is not anticipated that GDP growth rate will either match or surpass that of population increase in the foreseeable future. For this to happen, gross domestic investment will need to be considerably increased, particularly in the area of labor-intensive industrialization and in the promotion of small- and medium-scale enterprises (both formal and informal). Furthermore, Swaziland will need to substantially promote the commercialization of agricultural activities with a view to inducing real gains in incomes at the level of the farmer, promoting on-farm employment, and generating favorable effects on household food security.

The envisaged improvement in GDP growth rate in 1996 was predicated on the assumption that recovery of the agricultural sector would materialize due to improved climatic conditions that prevailed during most of this year. While the favorable climatic conditions in 1996 had a positive effect in expanding production in the commercial farming sector, the semi-subsistence sector did not benefit from this development due to paucity of finance for procuring essential inputs. Therefore, the net effect of improved climatic patterns in 1996 was not as dramatic as was anticipated.

This was expected to play a positive role in enhancing the manufacturing sector that relies largely on agricultural raw materials. The commercial farming sector of Swaziland, in particular, displays some powerful backward and forward linkages with the rest of the Swazi economy. This is particularly the case in respect of the manufacturing sector. Agriculture, therefore, provides a strong multiplier effect on both the country's balance of payments and national employment. The contribution of agricultural production improvements to national welfare is, therefore, far more significant than indicated by national statistics.[11]

[11] For a highlight of some of the effects of expansion and commercialization of agriculture on national welfare, see Joachim von Braun, Howard Bouis, Shubb Kumar and Rajul Pandya-Lorch, *Improving Food Security of the Poor: Concept, Policy, and Programs*, International Food Policy Research Institute, Washington D.C., 1992, pp. 20–21.

2.3 ROLE AND MAGNITUDE OF SWAZILAND'S EXTERNAL TRADE

As indicated earlier, one of the most defining characteristics of the Swaziland economy is that it is both open and export-oriented. Trade constitutes a major proportion of the country's GDP and plays a very important role in the operation of a significant segment of the country's industrial sector. Consequently, the performance of the economy of the country is highly vulnerable to exogenous shocks. Considerations such as global trends in economic activity and growth, commodity prices, and capital and aid flows play a major role in determining the prosperity of Swaziland's economy. Foreign trade is supported mainly by the country's membership in a number of multilateral organizations such as the CMA, SACU, SADC, COMESA, and the EU-ACP Lome Convention. Globalization and efforts at promoting inter-regional trade and investment are features that are fast becoming the major hallmarks of the country's development efforts. Despite this emerging emphasis, South Africa remains Swaziland's single most important trading partner and its main source of foreign investment. South Africa supplies roughly 80% of Swaziland's imports and is a recipient of approximately 50% of the country's total exports. The rest of the SADC countries import about 15% of Swaziland's exports. As a member of the Africa, Caribbean and Pacific (ACP) group of countries, Swaziland's exports also benefit substantially from the preferential trade conditions associated with the Lome Agreement between ACP and member countries of the European Union.

Despite the level of exports to the industrialized countries in the North, there are strong indications that Swaziland now realizes the major gains to be achieved by re-orienting its volumes of export towards the southern African region. There is no doubt, for instance, that the high level of Swaziland's economic integration with the South African economy has become a major influence in deciding prospects for sustained growth of Swaziland's economy. In addition, Swaziland's commitment to increased inter-regional trade with the rest of the Eastern and southern African region has substantially increased in recent past. Current initiatives such as the determination by COMESA to progressively reduce tariffs among member states and the advent of the 1996 SADC Free Trade Protocol have given Swaziland further encouragement to intensify her efforts at facilitating trade with both COMESA and SADC member countries. These developments underscore the fact that, in the future, Swaziland's development prospects will be largely circumscribed by the success or failure of her initiatives to increase trade with the rest of the countries in Eastern and southern Africa. Considerations such as "...import/export matters on traded goods and services, labor mobility, investment promotion and restructuring [of] agricultural productive efforts on products/produce where Swaziland has a strong comparative advantage over its neighbors in the region" will play an increasingly prominent role in the future growth and development prospects for the country."[12]

The pace of globalization and the anticipated changes that will result from the Marrakech Accord of the World Trade Organization's (WTO) Uruguay Round are also expected to play a significant role in the determination of Swaziland's competitiveness in international trade. Furthermore, the likely revocation of the Lome Convention at the expiry of the current agreement in the year 2000 is bound to have a direct and major impact in determining Swaziland's volume of trade with the EU countries.

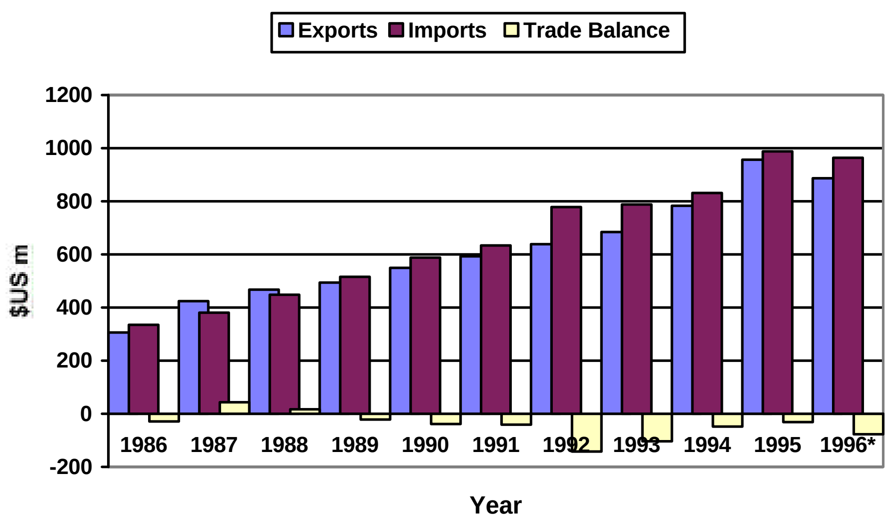
[12] National Development Strategy, *The Agriculture, Land and Rural Development Sector (Draft)*, Ministry of Economic Development and Economic Planning , Mbabane Swaziland, 28 August 1996, p.16.

Table 2.3. Swaziland's Value of Exports (f.o.b.), Imports (f.o.b.), and Balance of Trade (US$ mil)

Year	Exports	Imports	Trade Balance
1986	306.0	335.3	-29.3
1987	424.9	382.4	42.9
1988	467.1	450.0	17.5
1989	493.7	515.5	-21.5
1990	549.5	589.0	-38.9
1991	593.6	635.1	-41.3
1992	638.2	779.5	-141.1
1993	684.5	788.7	-103.9
1994	783.1	831.7	-48.3
1995	957.7	989.3	-31.3
1996*	887.8	964.8	-77.0

Source: Central Bank of Swaziland; *Annual Report 1996/97 (Draft*), Mbabane, Swaziland, May 28,1997**.**
* Preliminary estimates

Figure 2.2. Exports, Imports and Balance of Trade



In the recent past, Swaziland's economic activity has slowed down considerably due to weak external demand, declining prices for the country's traditional exports, and the drought conditions which prevailed in the first few years of this decade (particularly, in 1991/92). As a result, the country's trade and current accounts deficits have appreciably expanded. Poor terms of trade and declining volumes of traded goods are reflected in an increasingly deteriorating balance of trade position of the country (see Table 2.3 and Figure 2.2 above).

2.4 OVERVIEW OF THE ROLE OF THE AGRICULTURAL SECTOR IN THE ECONOMY OF SWAZILAND

As indicated earlier, the agricultural sector plays a significant role in the country's development and is undeniably one of the leading sectors with regard to the extent to its contribution to the economy's GDP. There is, therefore, no doubt that agriculture will constitute a major force in the determination of the country's medium to long-term growth prospects. It is important to note, nevertheless, that, since the early 1990s, agriculture's contribution to the GDP has shown a considerable degree of deterioration due to adverse climatic conditions (namely, drought). Though this adverse trend has been sustained since 1992/93, it was anticipated that there would be a reversal in 1996 due to the good rains experienced during this year's cropping season. Maize and cotton yields (crops grown mainly on Swazi Nation Land[13] under rain-fed conditions), in particular, were expected to improve substantially on account of favorable weather patterns which were widespread in most of the country during the 1996 cropping season. However, tentative estimates indicate that a virtual moratorium by the Swaziland Development and Savings Bank in providing credit to farmers (caused by Government-induced restructuring actions aimed at strengthening the Bank) has badly affected farmer yields and has, in fact, resulted in a massive decline in maize production during this year.

Table 2.4 below illustrates the magnitude of agriculture's contribution to GDP vis-à-vis other sectors of the Swazi economy. While it could be noted that agriculture's share of GDP has consistently been below 15% since 1990, there is, nonetheless, no doubt that agriculture constitutes a major lifeline in Swaziland's economy. It is a primary contributor to the sustenance of a vast majority of Swaziland's population, and, with some restructuring, could serve as a main source of the country's competitiveness in regional and global markets. The agricultural sector plays a particularly important role in the provision of intermediate inputs for the manufacturing sub-sector, forms the major source of Swaziland's export earnings and is an important employment-generating sector for a significant percentage of the country's formal labor force. However, it is important to note that "although agriculture represents a significant component of the Swazi economy, it forms a much smaller share of GDP than it does in the rest of sub-Saharan Africa.[14]

Table 2.4. Sector Contribution to GDP at Factor Cost (%)

SECTOR	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96
Agriculture	13.2	13.8	10.6	9.8	9.8	8.8
Mining	2.3	1.5	1.9	2.0	2.0	1.9
Manufacturing	37.7	37.3	37.9	37.1	37.4	37.9
Electricity & Water	2.9	2.9	3.2	3.2	3.2	3.1
Construction	2.4	2.1	2.8	3.3	3.8	4.0
Retail, Hotel & Restaurant	9.1	8.7	8.3	8.8	9.1	9.8
Transport & Communication	5.5	6.3	6.8	6.8	6.9	6.2
Banking & Insurance, Real Estate	7.7	7.0	7.2	7.2	6.8	6.6
Government Services	17.2	17.9	18.8	19.3	18.5	18.8
Other**	4.9	5.4	5.7	5.7	5.7	6.0
GDP @ Factor Cost	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Source: Central Statistical Office.
**Includes forestry, owner-occupied dwellings and other services.

[13] Swazi National Land is described at a later stage.
[14] World Bank, *Swaziland Financial Sector Study*, Washington D.C., May 15, 1996, p. 79.

Swaziland's agricultural sector exhibits a distinctly bimodal pattern of ownership, production technology and productivity patterns. These production systems are, respectively, located on the Swazi Nation Land (where communal ownership of land is the norm) and on Individual Tenure Farms (where there is private ownership of land).

2.4.1 The Swazi Nation Land (SNL)

The SNL, covering 66% of the country's land area, has a communally based tenure system whereby the King holds land in trust for the Swazi Nation. Rights to land on the SNL are derived from traditional social relationships which stipulate that land can only be used but not sold. Small-scale farmers, concentrated on the SNL, tend to produce food crops mainly for subsistence and only market occasional surpluses. A number of crops and crop mixtures are grown in this sub-sector and these include maize, cotton, vegetables, and groundnuts. The raising of livestock (mainly cattle, goats, pigs, chicken, sheep, etc.) constitutes the primary occupation of farmers on Swazi Nation Land. Communal grazing is the most dominant practice due to the system of land tenure that is prevalent in this sub-sector.

Agricultural production on SNL is predominantly labor intensive and is characterized by low average yields per unit area. Most agricultural production on SNL is rain-fed and is, consequently, very vulnerable to adverse climatic conditions such as drought. Together with income remittances from formal wage employment, agriculture in this sub-sector is the main source of livelihood for most Swazis. It provides "...most of the food supplies as well as being a source of socio-economic security for the majority of Swaziland's population."[15] However, it is important to note that smallholder agriculture's contribution to Swaziland's GDP is very modest and has not, in recent past, contributed significantly to the country's economic growth.

Despite the fact that farmers on SNL utilize most agricultural production technologies recommended by the Ministry of Agriculture and Cooperatives, a variety of bottlenecks continue to play a significant role in making the SNL agriculture a passive participant in the overall agricultural production activities of the country. This, in no small measure, impairs the contribution of this sub-sector to the nation's gross domestic product. Some of these impediments include inappropriate pricing and other public sector policies, poor performance of the extension service, non-availability of credit, labor shortages at critical farming stages, profitability of the wage sector relative to farming, etc. With regard to the latter, the rural-urban wage gap (typified by a falling marginal product of labor in the rural sector) has been found to play a major role in accentuating the poor performance of the farming sector on SNL. This is a clear indication that markets in this sector are not functioning as well as they should be; Swaziland has not succeeded in engendering a policy environment whereby the country's rural, urban and foreign economies exhibit strong linkages. Swaziland has not thoroughly addressed the need for bringing "...the per capita income of people in the rural economy to levels that are commensurate with the per capita income levels in the urban economy."[16] This is fundamental if this sector is to exhibit improvements in performance.

The contribution of the SNL agricultural sector to total national output is quite low due to its semi-subsistence nature and increasing reliability on rainfall. It ranged between one and two percent in the period 1992-1994 as compared with eight to eleven percent from the Individual Tenure Farms (described below). Furthermore, agricultural production on SNL contributes less than 50% of average homestead's income and "...there is a considerable dependency on wage earnings with 60% of the working male and 30% of the working female homestead members occupied in paid employment in plantations, manufacturing, trading and service industries".[17] This latter point provides the major drawback in enabling agriculture to play a significant role in improving livelihoods on SNL.

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[15] National Development Strategy, *Strategic Issues in Swaziland's Agricultural Development*, Ministry of Economic Planning & Development, Mbabane, Swaziland, January 1994, p. 20.
[16] David Seckler (ed.), *Agricultural Transformation in Africa*, Winrock International Institute for Agricultural Development, Arlington, Virginia, 1993, p 23.
[17] National Development Strategy, *Ibid*., 1994

The major challenge facing the Swazi nation is, therefore, to vigorously pursue strategies that will transform the SNL in such a manner that it is able to achieve the following objective criteria:

- An SNL that exhibits high productivity levels and diversified agricultural production;
- An SNL that exploits the linkages which exist between agriculture and other sectors in the overall economy;
- An SNL that readily takes advantage of emerging local, regional, and international opportunities;
- An SNL that provides more income opportunities to the rural population; and
- An SNL that is able to enhance the quality of the natural resource base through adoption of improved farming practices.[18]

Some of the primary factors that inhibit agricultural performance in this sector include the following:

- Unpredictable weather patterns.
- Post-harvest losses caused by poor storage facilities.
- Poor marketing infrastructure and policies.
- Poor extension services.
- Unavailability of credit.
- Poor input supply systems/infrastructure.
- Lack of technical packages appropriate for smallholders.
- Insistence to produce some agricultural commodities (e.g., maize), everywhere in Swaziland even in areas of poor potential.

As indicated above, the most important crops grown on SNL are maize, cotton, vegetables, and groundnuts and these are briefly described in the following paragraphs.

Maize:

Being the main staple for most Swazis, maize is the most dominant crop grown on the SNL (see Table 2.5 and Figure 2.3 below). It is followed by cotton, groundnuts and, to a limited extent, tobacco and vegetables. The SNL response of maize production to rainfall patterns is an extremely notable feature of Table 2.5. For instance, the extremely low production and area under maize between 1990 and 1992 is reflective of the drought that prevailed during those years.

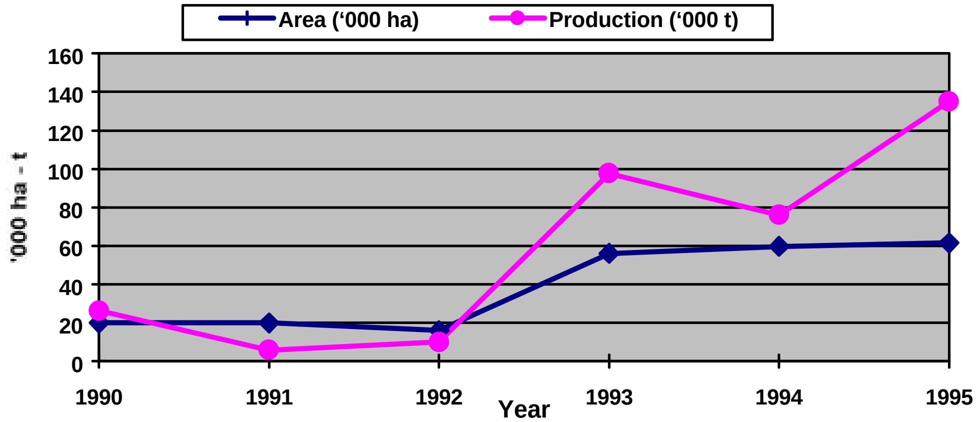
Table 2.5. Maize Area and Tons Produced

	1990	**1991**	**1992**	**1993**	**1994**	**1995**
Area (‘000 ha)	20.0	20.0	16.0	56.1	59.7	61.5
Production (‘000 t)	26.3	5.9	10.0	97.7	76.0	135.0

***Source*:** Central Statistical Office and Ministry of Agriculture & Co-operatives

[18] National Development Strategy, *The Agriculture, Land and Rural Development Sector (Draft*), Ministry of Economic Planning and Development, Mbabane, 28 August, 1996, p.4

Figure 2.3. Maize Area and Production



Cotton:

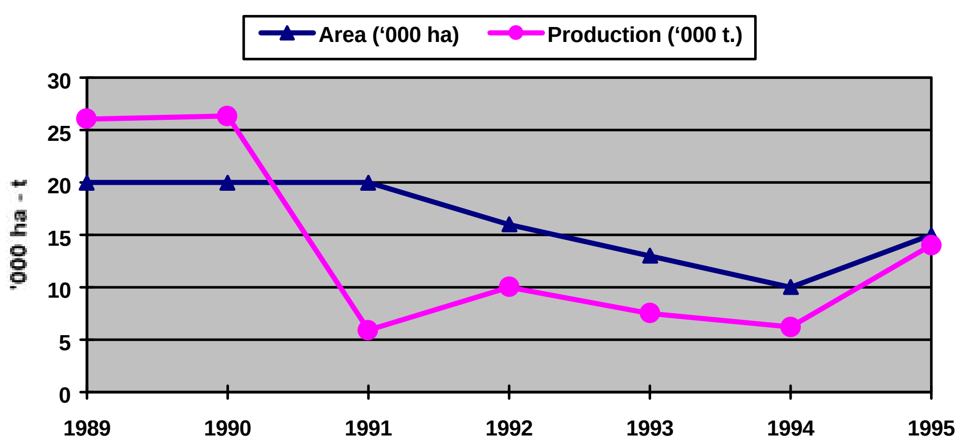
Cotton is the second most important crop grown on SNL. It is mainly concentrated in the Lowveld and, to a lesser extent, in some parts of the Middleveld. Though cotton production has shown a lackluster performance during the drought years of the early 1990s, it has demonstrated remarkable improvement since the 1995/96 cropping season due to improved weather conditions. Prospects for the 1996/97 production year are very optimistic due to the sustained improvements in weather conditions and a significant increase in the price of seed cotton. However, availability of finance[19] and the gradual reduction of tariffs, prompted by the stipulations of the General Agreement on Trade and Tariffs (GATT), are expected to have a retarding effect on cotton production in Swaziland. The latter is expected to serve as a full-proof litmus test for the regional and global competitiveness of Swaziland's cotton industry. Table 2.6 and Figure 2.4 demonstrate the recovery of the cotton industry.

Table 2.6. Seed Cotton Production and Area under Cotton

	1989	1990	1991	1992	1993	1994	1995
Area ('000 ha)	20.0	20.0	20.0	16.0	13.0	10.0	15.0
Production ('000 t.)	26.058	26.340	5.879	10.000	7.500	6.183	14.000

***Source*:** Central Statistics Office & Ministry of Agriculture and Co-operatives

Figure 2.4. Cotton Area and Production



An increase of about 17% in the cotton price in the 1995/96 cropping season has dramatically increased production from 6,183mt in 1994/95 to 14,000mt in 1995/96. It is envisaged that volumes of cotton production will

[19] SNL cotton growers have historically relied on the Swaziland Development and Savings Bank for credit. However, this bank is currently facing serious financial difficulties.

be dramatically increased in 1996/97 due to a combination of increased participation of farmers in cotton production and favorable weather conditions. Nevertheless, it should be underscored that "...future prospects of cotton production are dependent on improved weather conditions, availability of finance and the effects of the gradual reduction of tariffs stipulated under the GATT."[20] The survival of the cotton industry in Swaziland, therefore, depends on its ability to effectively compete in the global market.

Groundnuts:

This forms an important cash crop in the SNL sector. Virtually all of Swaziland's groundnuts are produced on SNL and the ITF contributes very little to national output of this commodity. Table 2.7 and Figure 2.5 below depict the coverage and annual output of groundnuts in Swaziland since 1993. Compared to the situation during the late 1970s and the early 1980s when the area was less than 3,000ha, recent figures show a tremendous expansion in production area. The increasing production trend is indicative of the growing importance of this crop among SNL farmers. However, production is highly affected by the variability in climatic conditions, especially rainfall, and incidence of pests and diseases.

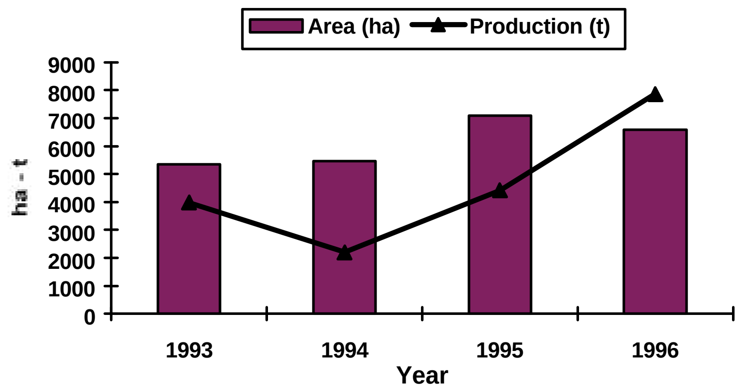
[20] Central Bank of Swaziland, *op. cit*., May 28, 1997, p.63.

Table 2.7. Groundnut Area and Production

	1993	1994	1995	1996
Area (ha)	5341	5454	7084	6596
Production (t)	3981	2203	4413	7868

Source: Central Statistics Office & Ministry of Agriculture and Co-operatives

Figure 2.5. Area and Production of Groundnut



2.4.2 The Individual Tenure Farms (ITF)

Land in this sub-sector is owned through freehold and concessionaire title and includes commercial forests, farms and ranches, as well as land owned by the Swazi Government. Large-scale producers tend to be located on the ITF. The ITFs consist of roughly 800 farms that produce mainly sugar cane, citrus, pineapples, cotton, maize, vegetables, and cattle. This sub-sector "...is based on more commercially developed, large-scale, capital intensive enterprises with high employment generation costs, export orientated production and a very considerable dependence on foreign private capital and management."[21] Most products of the ITFs are destined for the export markets. Hence, most growth in export earnings is derived from this sub-sector, which further forms a source of much of the needed employment and national wealth. Crop production on ITFs is mainly based on irrigation; consequently, this sub-sector has not been as adversely affected by the drought of the early 1990s as farmers on the SNL have. Sugar cane is the most dominant crop and leading export earner produced mainly on the ITFs. A brief account is given here on the major crops grown on this sub-sector.

Sugar:

The Swaziland Sugar Association (SSA) markets the sugar produced in the country's three mills. Though volumes of sugar exports have progressively declined in the recent past, due to increased domestic demand, export earnings have, nevertheless, substantially increased due to the declining value of the local currency, the Lilangeni, and good prices received under the country's preferential trade agreements (see Table 2.8 and Figures 2.6 and 2.7 below).

Table 2.8. Sugar Production and Sales (Volume in Mt tel quel)

	1990	1991	1992	1993	1994	1995	1996
Production (Mt)	496,438	490,364	494,752	457,268	485,155	421,997	470,988
Exports (Mt)	444,461	435,976	368,206	373,969	275,400	244,495	214,080
Value of Exports f.o.b. ($mill)	171.45	166.51	140.21	160.01	122.21	135.73	143.10
Value of Exports f.o.b. (Emil)	443.7	430.9	399.9	522.8	433.8	492.1	614.7
Domestic Sales (Mt)	42,094	51,628	84,653	126,880	173,446	182,895	205,555

Source: Swaziland Sugar Association**.**

[21] National Development Strategy, op cit., January 1994, p. 20.

Figure 2.5. Production and Value of Exports of Sugar

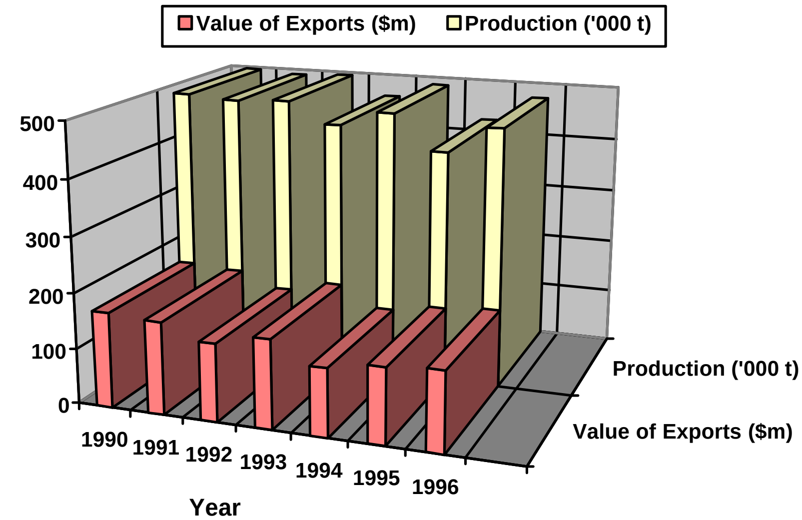
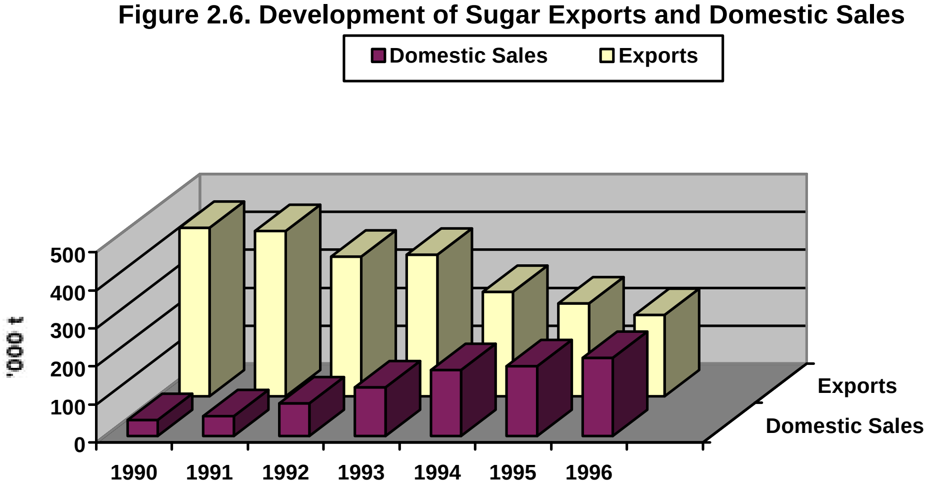


Figure 2.6. Development of Sugar Exports and Domestic Sales



The considerable increase in domestic sugar consumption is mainly attributable to the expansion of the local manufacturing sector that uses sugar as its main input. Locally-based sugar using entities and the regional sugar markets have proven to provide even higher and more stable prices than those of markets in overseas industrialized countries.

Woodpulp:

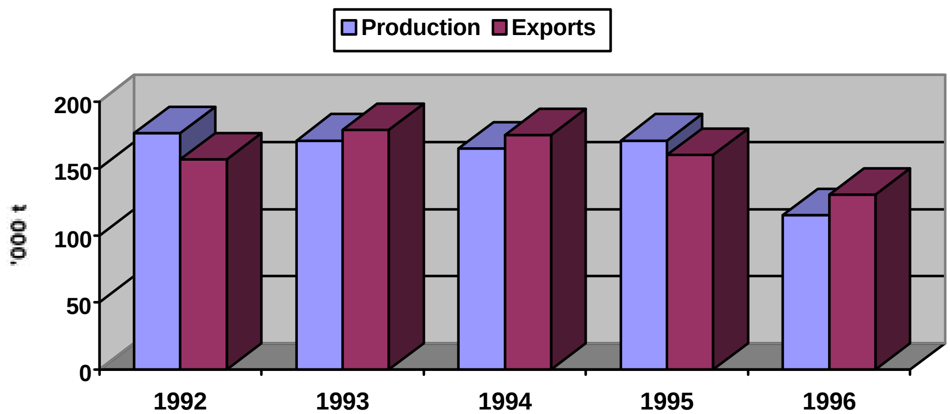
The production of woodpulp showed a close to 33% decline in 1996. This was caused by significant labor problems experienced at the beginning of 1996 and some mechanical difficulties during the launch of Usutu Pulp Company's new digester plant. The fall in production levels in 1996 also adversely affected export earnings from this sector of Swaziland's economy (see Table 2.9 and Figure 2.7 below). Barring unforeseen difficulties, it is envisaged that the 1997 production levels will exceed 200,000 metric tons and that prices in the international markets will so considerably increase that the industry will experience substantial improvements in export earnings.

Table 2.9. Unbleached Kraft Production and Exports

Year	1992	1993	1994	1995	1996
Production (Mt)	176,477	170,846	164,734	170,857	115,045
Exports (Mt)	156,870	178,678	174,909	160,296	130,635
Value of Exports f.o.b. ($'000)	60,026	52,005	71,251	121,555	55,888

Source: Central Bank of Swaziland

Figure 2.7. Unbleached Kraft Production and Exports, 1992-1996



Citrus fruits:

Swaziland's total area under citrus production expanded slightly in 1996, resulting in a marginal increase in output from 85,000 tons in 1995 to 87,000 tons in 1996. In line with this increase, export volumes expanded by 17.4%. The European Union remained the leading export destination for Swaziland's citrus produce, followed by Eastern Europe, the Middle East, and Far East, respectively.

Both the good quality of the crop and the depreciation of the local money against major currencies substantially improved export earnings. Consequently, export earnings surged by roughly 52% between 1995 and 1996. Domestic sales in 1996 also showed an approximately 4% increase between 1995 and 1996 (see Table 2.10 and Figures 2.8 and 2.9).

Future prospects for Swaziland's citrus industry are dependent on climatic conditions and supply levels in international markets. "Export prices for traditional markets are not bright given the stiff competition from other exporters, particularly South America and southern Africa, whose large supplies tend to have a dampening effect on prices."[22]

Table 2.10. Citrus Production and Sales

	1991	1992	1993	1994	1995	1996
Production ('000mt)	66.2	70.6	66.9	104.1	85.0	87.2
Area under trees ('000ha)	2.5	2.6	2.8	2.9	2.9	3.0
Exports ('000mt)	31.1	33.4	29.1	49.4	42.6	50.0
Value of exports f.o.b. ($mil)	14.6	14.7	12.4	15.6	15.4	19.8
Domestic Sales ('000mt)	25.4	27.7	28.1	40.7	38.0	39.5

[22] Central Bank of Swaziland, *op. cit.*, May 28 1997, p.70

Source: Swaziland Citrus Board

Figure 2.8. Production and Export Value of Citrus Fruits

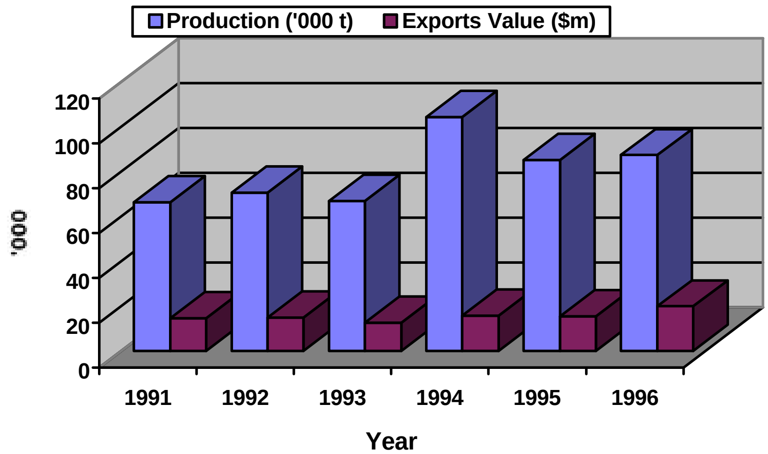
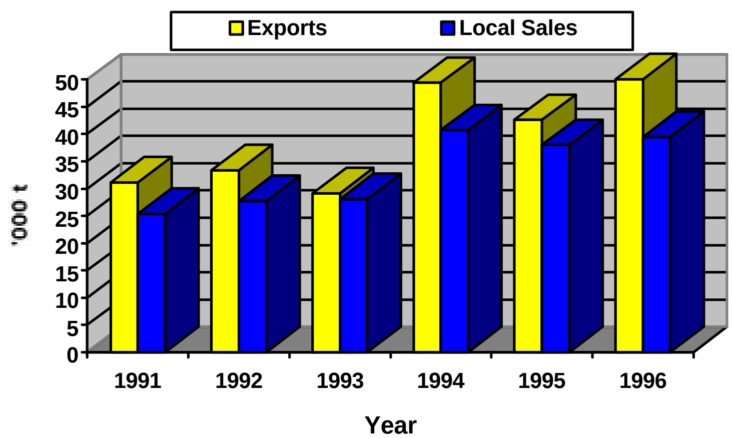


Figure 2.9. Exports and Local Sales of Citrus Fruits



Fruit canning:

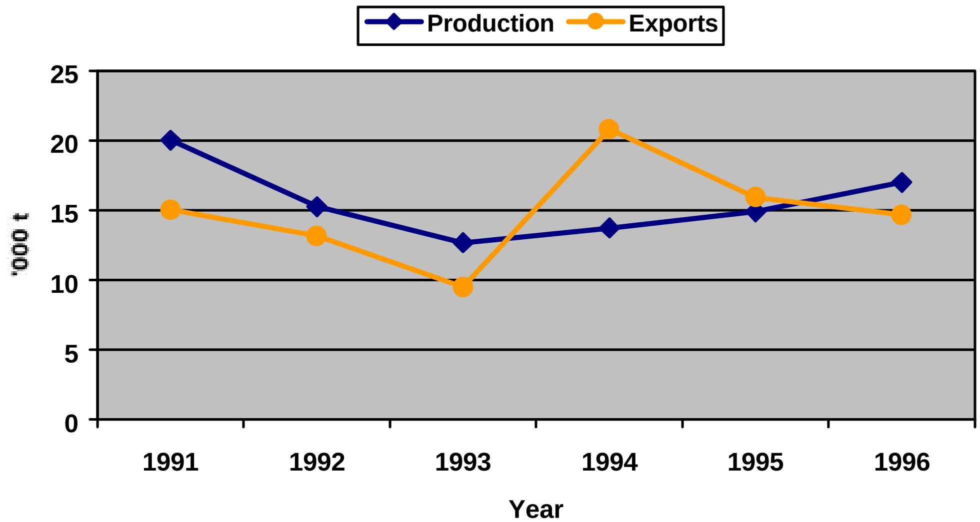
Swazican, a factory that produces a variety of fruit products such as pineapple rings, pieces, juices, and citrus segments, juices and jams, carries out fruit canning in Swaziland. In the past year, drought and low prices have resulted in considerable reduction in area under pineapple. However, production at Swazican increased substantially in 1996 due to good harvests of citrus fruit and buoyant citrus prices created by reduction of stocks in the global markets. Consequently, export earnings increased by about 8% over the 1995 value of exports (Table 2.11 and Figure 2.10). Most exports of canned fruit products were destined to Europe, Japan, South Africa, and the Far East.

Table 2.11. Canned Fruit Production and Sales

	1991	1992	1993	1994	1995	1996
Production (Mt.)	20,018	15,256	12,674	13,733	14,897	16,993
Exports (Mt.)	15,033	13,144	9,495	20,817	15,933	14,668
Value of Exports f.o.b. ($mil)	19,285	16,091	10,610	13,385	13,679	12,507
Domestic Sales (Mt.)	18.0	36.0	15.0	55.4	299.0	200.0

***Source*:** Central Bank of Swaziland

Figure 2.10. Canned Fruit Production and Exports



Pineapples:

Production of pineapples is mainly located in the Malkerns Valley, within the Middleveld agroecological zone. The bulk of the Swaziland pineapples are produced by both the Swazican and several outgrowers, including farmers located at a settlement scheme called the *Mphetseni Settlement Scheme*. In addition, Swazican imports some pineapples from South Africa. Swazican is the only processor of pineapples and is, therefore, the sole market for fresh pineapples in the country (other than pineapples delivered to local fruit markets).

The global market has suffered from a combination of increased supply of pineapples and depressed demand. Hence, world prices for pineapple products have witnessed a downward trend over several years. The tremendous increase in world supply has been caused mainly by a "…shift in production from the traditional producers such as Hawaii to countries that have better climatic conditions and lower labor costs such as Vietnam, Thailand, Indonesia, and the Philippines…"[23] This situation has had some adverse repercussions on the viability of both Swazican and outgrowers. Consequently, for years Swazican has been engaged in an intense process of rationalizing its activities and labor force reduction in order to reduce costs and to maintain its global competitiveness and market share. Table 2.12 and Figure 2.11 below demonstrate the increasingly declining levels of Swazican output due to the rationalization of the firm and the effect of drought during the years 1992 and 1993.

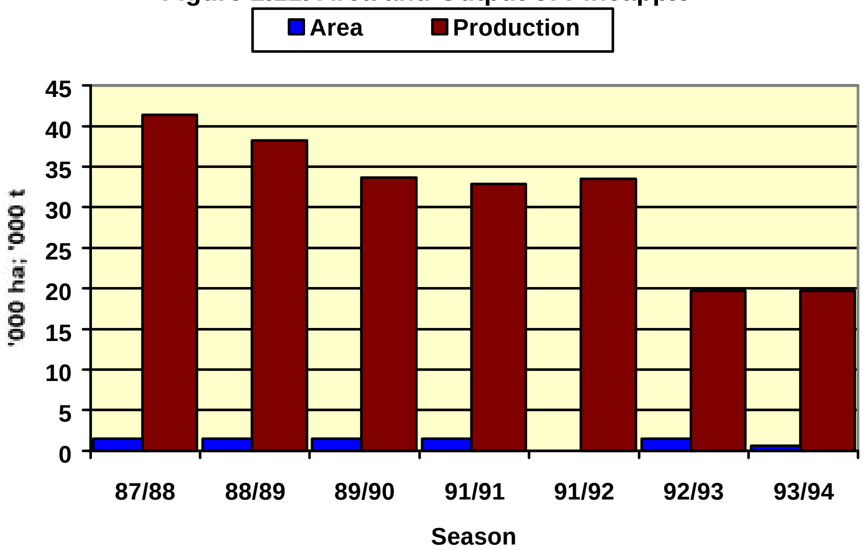
Table 2.12. Seasonal Areas and Output of Pineapples

Years	Area (ha)	Production (Mt)
1987/88	1480	41417
1988/89	1480	38247
1989/90	1480	33655
1990/91	1480	32857
1991/92	…	33520
1992/93	1480	19680
1993/94	601	19700

Source: Central Statistical Office, *Annual Statistical Bulletin, 1994*, Swaziland Government, Mbabane, p. 26.

[23] Ministry of Economic Planning and Development, *Development Plan 1995/96–1997/98*, Mbabane, April 1995, p. 60.

Figure 2.11. Area and Output of Pineapple



2.5 AGRICULTURAL POLICY

A thorough description of the agricultural policies that are operative in Swaziland requires an understanding of four policy aspects. First, there is a necessity to identify the types of marketing and trade policies and the institutions that have been set up to implement such policies in the country. Secondly, it is important to scrutinize opportunities for and constraints to agricultural development created by the macroeconomic environment that prevails in the country. Thirdly, the comparative advantage of agricultural production as compared to other explained below in the case of maize policy, the Swaziland Government is currently engaged in a process of re-assessing its role with a view to progressively enable the private sector to become the major driving force in supporting the country's goal of making strong and sustained advances in the performance of the agricultural sector.

The attainment of sustained and equitable agricultural development is one of the greatest challenges facing the Swaziland Government. However, a variety of countries in the region should be examined. Fourth, restraints to agricultural production, especially as they relate to poverty alleviation, must be clearly identified.

Even though the overall policies of the Swaziland Government are supposedly based on liberalization and minimal interference in the operations of the private sector, the agricultural sector seems to be an exception in this regard. Government intervention has historically been a major feature in national efforts to ostensibly encourage enhanced and sustainable agricultural output. This has been the case especially in policies that are directed at SNL agricultural production, marketing, and trade. The Ministry of Agriculture and Co-operatives, together with a variety of institutions set up to ostensibly prop up and facilitate agricultural production, are responsible for promoting the Government's medium and long-term development strategy for the agricultural sector. However, as will be of macro-economic factors has played a remarkable role in retarding growth of the agricultural sector. Consequently, overall growth in agricultural output has persistently lagged behind the rate of population increase, thus creating a chronic deterioration in per capita incomes and living standards. The poor performance of the agricultural sector has been particularly acute and chronic on the SNL sub-sector. In addition, the agricultural sector has displayed great vulnerability to exogenous influences. For instance, "...with falling prices of primary products, export earnings have declined while import costs have increased, resulting in a continuous decline in government revenues..."[24]

Government's policy with regard to the SNL sub-sector has therefore placed a lot of emphasis on the following:

[24] *National Development Strategy,* op. cit., 28 August, 1996, p.11

- food self-sufficiency to enable the country to be independent of imports in the satisfaction of domestic demand for staple foods (mainly maize),
- surplus production, through improved productivity, and progressive commercialization of agricultural production in the SNL sub-sector, and
- progressive intensification of the production system in the smallholder sector.

The national policy of Swaziland readily acknowledges the critical importance of agriculture in the promotion of social and economic welfare, particularly as it relates to the provision of employment (both formal and informal), reduction in the incidence of poverty, and supply of raw materials for stimulating private sector enterprises. Swaziland's agriculture supports many industries in the country and is; therefore, key to the sustenance of the country's diversified economy. The policy of the Swaziland Government is, therefore, quite emphatic in recognizing vibrant and expanding agricultural growth as an elixir for exorcizing the country of the many socio-economic challenges currently facing it. While the urgent need for improving the performance of the agricultural sector is widely acknowledged, it is hardly agreed as to what approaches to implement in order to accelerate improvements in this sector. The available policy instruments employed to enhance the role of agriculture in the Swazi economy are fraught with a variety of defects and tend to be at variance or incompatible with the objective of accelerating agricultural growth and making the practice of agriculture, particularly on the SNL, a profitable enterprise. Though, as indicated earlier, Swazi agriculture has wider implications in terms of the general national economy, the national agricultural policy does not seem to be based on an overt framework that aims at optimizing the linkages between the agricultural sector and the rest of the Swazi economy. Also, the national policy fails to take advantage of the multiplier effects that could conceivably be attained through a well-functioning market environment.

Until recently, the Government's food policy has been based mainly on achieving self-sufficiency in maize production and this has been reflected primarily through price and market intervention. The high priority placed on self-sufficiency in maize was ostensibly directed at ensuring higher levels of self-reliance in the production of food and reduction of imports. However, this policy ignored the comparative advantage of the country's natural resource base and the potential returns to some factors of production (e.g., labor) from alternative occupations.

According to Murkherjee and Robinson, for instance, the insistence by several southern African countries on achieving food self-sufficiency was, until recently, the major impediment to interregional trade in agricultural commodities. "The region's continued preoccupation with food self-sufficiency is understandable, given its experience with periodic supply shocks due to drought and war. Even in the new atmosphere of liberalization, southern African governments have extremely abolished grain import—and especially—export controls."[25] However, available information demonstrates that, in the case of the Swaziland government's objectives for achieving food security in maize and other major cereals, the policy of working towards liberalized markets has not been used as a guide. A variety of quantitative and other protectionist policies have been imposed in order to protect domestic producers, ensure that maize consumption is ostensibly at an affordable price and to limit imports. Swaziland's policy has tended to think of food security in isolation from other sources of income.

Despite these policies, however, commercial imports of maize and food aid aimed at satisfying domestic demand have persisted over the years. "This indicates that the policy of producing maize to the level of self-sufficiency is not achievable"[26]. Sufficient evidence has been amassed to demonstrate that the maize self-sufficiency policy is not only unattainable but is also wasteful of scarce resources.

As indicated in Table 2.13 and Figure 2.12 below, Swaziland has consistently failed to achieve its policy objective of self-sufficiency in maize production. Perennial maize deficits are a major source of food insecurity and a

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[25] Natasha Murkherjee and Sherman Robinson, op. cit., 1996, p. 18.
[26] Ministry of Economic Planning and Development; *Development Plan 1996/97-1998/99*; Mbabane, Swaziland, April 1996, p. 57

drain on the foreign currency earnings of the country. "It therefore seems appropriate... for the Ministry of Agriculture to reconsider the objective of self-sufficiency and address the issue of food security"[27]. This implies that food security policy must aim at redirecting resources to those enterprises and/or economic activities that exhibit maximum profitability and competitiveness. It is for this reason that the Swaziland Government has now embarked on measures for transforming policies affecting the maize industry in the country.

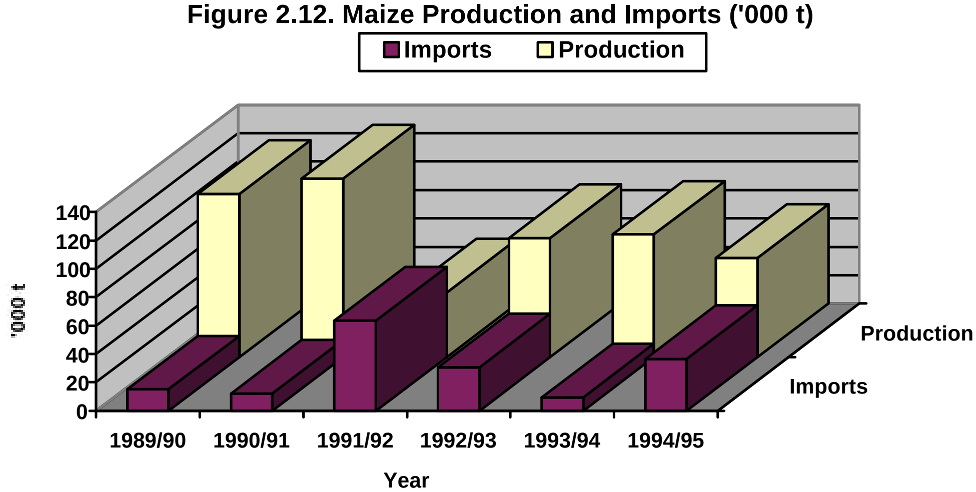
Prior to 1994/5 "…the maize marketing structure had evolved into an overly complex system, involving a number of different bodies, due primarily to historical reasons. The dominant actor was the parastatal National Maize Corporation (NMC). Until 1985 commercial maize milling in Swaziland had been effectively a monopoly of the private Swaziland Milling Company (owned by the investment group, SWAKI, and hereafter refered (sic) to as SWAKI), with licensing on condition that SWAKI buy all locally produced maize at a guaranteed floor price gazetted by government."[28]

Table 2.13. Maize Production and Imports ('000 metric tons)

Year	Production	Imports
1989/90	115.0	15.1
1990/91	125.8	12.0
1991/92	45.6	63.6
1992/93	84.0	30.7
1993/94	863.7	9.3
1994/95	70.0	36.4

***Source*:** Ministry of Economic Planning and Development, *Development Plan 1996/97 - 1998/99*, Mbabane, Swaziland, April 1995, p. 57.

Figure 2.12. Maize Production and Imports ('000 t)



In 1985 SWAKI threatened to close down the maize milling aspects of its operations due to the insistence that they continue to purchase higher priced local maize even in the face of cheaper potential imports. The Ministry of Agriculture and Cooperatives (MOAC), in a drive to break the SWAKI "monopoly" and to protect maize production among Swazi farmers, created the NMC in the same year, 1985. The NMC was charged with the responsibility of

[27] Ministry of Economic Planning and Development , *Ibid*., April 1996, p.58

[28] Ministry of Agriculture and Cooperatives; *Policy Paper on Maize Marketing Reforms (mimeo.)*, Mbabane, December 1995, p. 1.

"…milling, buying of maize at central silos, financing crop purchasing, coordinating imports and logistics."[29] In addition to the NMC, the Central Cooperative Union (CCU) was mandated to be the only organization responsible for the purchase of maize in outlying regions. The purchased maize was stored in silos owned by the MOAC and run by the Ministry's Crop Storage Section (CSS).

In order to implement its operations, the NMC leased a maize mill from SWAKI. Further, it entered into a management contract with SWAKI to run the mill and to participate in the administration of all other activities of the NMC's business such as the purchase and selling of local and imported maize.

The above arrangements resulted in a very complicated marketing and processing structure for maize. Under this arrangement:

- the Government was made responsible for setting a pan-territorial and pan-seasonal floor price for maize annually, based on import parity;
- NMC, in conjunction with SWAKI, was responsible for the purchase and processing of maize. In addition, NMC was responsible for all imports of maize. Local maize producers enjoyed protection from competition by producers in neighboring countries through an import levy; currently 3% *ad valorem*;
- CCU was given the responsibility of purchasing local maize (particularly from areas that are remote from the government silos). For this service, NMC paid CCU a handling charge; and
- CSS, as indicated earlier, was responsible for the running of Government's grain silos.

This arrangement, however, proved extremely cumbersome and costly—it meant that NMC and CCU were compelled to rely on CSS for the storage of their maize. This was further exacerbated by the fact that CSS, a Government department, was continuously faced with serious budgetary constraints. In addition, the highly fragmented institutional responsibility for maize marketing created serious problems for effective coordination of maize marketing operations.

The problems encountered in the marketing and processing of maize have led to the establishment of a project called the *Maize Marketing Improvement Project* which aims at the re-design and liberalization of the maize marketing policy framework in Swaziland. This project, initiated in 1995, aims, among other things, to achieve the following objectives:

- expanding and rehabilitating the national silos;
- transferring the ownership and responsibility for operation and maintenance of the maize silos to NMC;
- terminating the lease agreement between NMC and SWAKI;
- setting up an independent management structure for running the NMC; and
- privatizing and removing the quantitative restrictions in the import of maize; and phasing out the setting of maize price by the Government.

However, it is not clear as to whether Government has eventually taken a definitive decision regarding the removal of the import levies on maize and maize products.

While the above goals of Government are quite clear with respect to maize, it is a fact that, for all intents and purposes, the national policy for the promotion of agricultural expansion and development continues to be fraught with a variety of institutional and structural bottlenecks that need to be addressed if agriculture is to attain its growth potential. Since Independence, the Swaziland Government has created a variety of parastatals and cooperatives whose *modus operandi* is specifically aimed at effecting the marketing, trade, and quantitative controls for imports of a variety of agricultural commodities. The operation of these institutions has managed to create marked distortions in the agricultural economy of the country.

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[29] Ministry of Agriculture and Cooperatives, *Ibid*., p. 2

Some of the quasi-government institutions, which have been created to engage in the promotion of facets of Swaziland agriculture, include the following:

- The NMC is a parastatal, which has played a central role in the marketing, processing, and storage of maize. As indicated above, the NMC has, for years, played a monopoly role in the local purchase and importation of maize, and has had an effective control over maize milling. The role of Government in setting the floor price for maize annually and the imposition of levies on imports by the National Agricultural Marketing Board (NAMBOARD) have served as an effective protection for local producers against cheaper maize from outside the country. Consequently, the price of maize, at an average of about US$169.00 per ton, has consistently been about 25% higher than that in South Africa and even much higher than world market prices.[30]

- The Government of Swaziland has placed considerable emphasis on the use of quantitative quotas and levies (much against the spirit of SACU) as policy instruments for regulating maize and other agricultural imports. This policy is applied principally NAMBOARD. This institution, for instance, imposes the following levies on maize imports: 3% on the value of imported maize and 5% on imported maize products. These levies are ostensibly directed at discouraging maize imports and, without any doubt, serve as a measure for protecting local producers against cheaper imports. The levies were also aimed at supporting measures for stimulating production among local producers. However, the failure of these measures in improving the domestic output of maize should be noted. Various reasons can be advanced for this situation. Furthermore, it is important to note that, not only is the revenue generated through the levies yet to be devoted to inducing improved productivity in local agriculture, but the levy concept itself raises very serious doubts concerning its efficacy in generating sustained increases in productivity among local producers and in inducing the efficient use of scarce resources.

- NAMBOARD is also empowered to control and regulate imports and exports of fruits and vegetables, to collect levies and to operate a fruit and vegetables market at Nokwane. NAMBOARD purchases farm produce from farmers through registered traders, licensed to operate only in specific locations in the country. Only registered traders can apply for import permits. The licensing of traders has had the effect of creating regional monopolies and has the potential of promoting corruption. It is undoubtedly an inefficient approach to promoting agricultural production and marketing.

  Various other parastatals have been created in order to intervene, in one way or another, in agricultural production and marketing. For instance, NAMBOARD is empowered to control and regulate imports and exports of fruits and vegetables, to collect import levies and to operate a fruits and vegetables market at Nokwane. NAMBOARD purchases farm produce from farmers through registered traders, licensed to operate only in specific locations in the country. Only registered traders can apply for import permits. The licensing of traders has had the effect of creating regional monopolies, and is, therefore, an inefficient approach to promoting agricultural production and marketing.

- The Swaziland Dairy Board (SDB) is another parastatal that is mandated to assist in the development of the dairy industry. SDB controls production and imports of dairy products and advises Government on the setting of prices of milk and other dairy products.

- CCU is a parastatal, which controls a number of depots for seed, fertilizer, and various agricultural chemicals. It competes with a small number of private sector companies that are in the business of providing markets for farm chemicals and inputs to farmers. Furthermore, as indicated earlier, CCU is responsible for the purchase of maize in some regions of the country.

[30] *WFP Committee on Food Aid Policies and Programs,* Swaziland - CSO 1995-1999, mimeo., CFA:38/SCP:13 Rome, Italy, 14 September, 1994, p. 9

- SSA is a cartel consisting of both growers and millers; it is empowered by law to regulate the production of sugar in the country. The Quota Board, consisting largely of Government-appointed members, determines the allocation of production quotas among sugar-cane producers. Once the sugar is produced, it becomes the property of the SSA, which arranges storage, transport and marketing of the product. A Price Review Committee (PRC) determines the distribution of proceeds among millers and growers. Government imposes a levy on sugar exports.

The use of parastatals as institutions for policy intervention in agriculture represents a net cost to the economy through its effect on:

a) the control of prices for a number of agricultural commodities;
b) retarding the development of local trade and satellite markets;
c) increasing the commercial costs of inputs and products, particularly to smallholders;
d) transferring the results of inefficient parastatal practices to consumers and producers;
e) quantitative controls on production;
f) exerting pressure on national budgets; and
g) destroying the role of competition in the supply of some products—thus forcing consumption at prices that are much higher than would otherwise be the case.

Despite the preceding point, the agricultural policy in Swaziland is also afflicted by some urban bias that tends to play the role of being a major disincentive to increased production at the farm level. The urban bias is reflected in the price controls that are imposed on various consumer products such as bread, maize meal, etc., in order to create low-cost consumption of some food items. Such a policy, which has the effect of subsidizing food consumption, is an important ingredient in reinforcing the currently weak linkages between the rural and urban economies and provides an unwitting incentive for farmers to engage in subsistence production.

Policy intervention in agriculture is manifested through price controls on many agricultural commodities, quota determination for the production of a number of important crops, and taxation imposed on most inputs and products. The net impact of the present marketing and trade policies on broad-based agricultural growth, employment creation, national and household food security can be said to have had the following effects:

- Government intervention has largely benefited large-scale commercial agricultural producers on ITF, or the few surplus producers on SNL.

- Government intervention has had the effect of discriminating against smallholders on SNL in favor of large farmers, resulting in lower reservation prices for land and lower returns to labor as compared to off-farm employment for smallholders.

- Insufficient incentives for smallholders to diversify the productive base of the rural economy or to produce marketable surpluses.

- Underdeveloped rural markets, resulting in lack of a vibrant rural economy that exploits the linkages between smallholder production, on the one hand, and off-farm and on-farm income and labor opportunities, on the other hand.

- High costs for consumers due to higher prices for staples, particularly maize.

- Increased opportunities for rent-seeking behavior in parastatals, and from large-scale producers and traders, due to regulation and taxation of agricultural trade and marketing.

The above points can be said to have had a major role in the under-performance of the agricultural sector in general, but particularly as it relates to agricultural growth on SNL. In addition, they have had the effect of depressing employment creation in the rural sector, accentuating poverty and food insecurity, particularly at the household level, and encouraging production practices that are environmentally unsustainable.

Swaziland enjoys high potential in the production of high-value crops and animal products - e.g., horticulture (citrus, sub-tropical fruits, flowers and vegetables), sugar, cotton, beef and poultry. This is due to:

a) the nation's low labor costs;
b) rich natural resource endowment and climate; and
c) recent currency devaluation which has made Swaziland's export products much cheaper than similar products produced in competing countries.

As indicated earlier, the formulation of a long-term (25 years) National Development Strategy (NDS) is expected to provide the country with various policy options for stimulating agricultural production and for achieving sustained food security through a framework which is anchored on the principle of efficiency in resource allocation.

While there are widespread indications that diversification of agricultural production and exports is the major avenue for enhanced competitiveness and profitability of Swaziland's agricultural sector in the region, minimal policy efforts are being devoted to this area. An area of greatest potential which remains poorly exploited, for instance, includes the development of appropriate strategies for the enhancement of non-traditional agricultural exports. Policy efforts to expand incentives for individual farmers and the private sector to take advantage of the opportunities accorded by the production of non-traditional exports are a long way from being a reality. To facilitate increases in the production of non-traditional crops, not only is the country required to design appropriate policies but there is also an urgent need for accelerated investments in agricultural research and technology aimed at yield enhancement of such commodities. In addition, it is necessary that the country improves its production support services such as rural financial institutions, rural infrastructure, improved access of farmers to modern inputs, the extension service, and enhanced urban-rural linkages.

The national drive towards moving the smallholder sub-sector to a more intensive system of production is frustrated by the high rate of population increase, the environmentally unsustainable modes of production and the prevailing system of land tenure on the SNL. Consequently, production is increasingly being extracted from marginally-productive lands, with adverse effect on the integrity of the environment.

3. Research Methodology

3.1 CONCEPT AND ASSESSMENT METHOD OF THE COMPARATIVE ECONOMIC ADVANTAGE (CEA) OF AGRICULTURAL PRODUCTION

The theory of comparative advantage dates back to David Ricardo in the second decade of the nineteenth century (Morris, 1990)[31]. The basic concept is that some areas, regions or countries enjoy an advantage, i.e., are relatively more efficient, in producing certain commodities compared to others. Comparative advantage may be attributed to more favorable natural factors, better resource endowments, well-developed expertise (skills), or infrastructure facilities. The theory points out that a country (or a region within a country) should specialize in the production of those commodities in which it can use its resources efficiently (i.e., in which it has comparative advantage) and import others in which it lacks comparative advantage in their production. In this way it can achieve net welfare gains. This is based on the involvement of countries in regional and international markets and is affected by their achievement of possible gains through trade.

In order to examine the comparative advantage concept, quantification of the returns to domestic resources used in the production of the commodity or commodities in question is needed. The yardstick is the international-market situation, where comparisons can be made on the efficiency of resource use to other commodities produced in the same region or country that compete for the same domestic resources. This provides information on their potential for expansion or reduction.

In principle, comparison of enterprises with respect to their returns to scarce production factors can be derived by the analyses of their gross margins, which provides a good basis for the evaluation of the economic competitiveness of various commodities. The problem is that such analyses are done at the financial level at which prices are distorted by many interventions, such as taxation, subsidies, price setting, and over-valued exchange rates. Such distortions preclude judgments about the profitability of commodities at the social level. To determine the comparative advantage, evaluation is done at the national level, i.e., using social rather than nominal prices. The yardstick is the international market prices that allow comparison against international opportunities of trade. In the analysis, social costs and returns of producing a commodity are derived by excluding all distortions so that the situation can be compared with that of the international market.

Ample review of the DRC methodology is given in Morris (1990) while comprehensive explanation of the analysis with the Policy Analysis Matrix is given in Monke and Pearson (1989)[32]. The procedure begins with the estimation of social costs and prices and the determination of enterprise budgets for the crops for which the comparative advantage needs to be evaluated. A locally produced commodity has to generate foreign exchange returns or provide foreign exchange savings that exceed the value of traded inputs used in its production. This implies that the foreign exchange cost of producing the commodity must be less than its export cost. Moreover, the foreign exchange savings in producing the commodity must be greater than the opportunity cost of using domestic resources, such as land, labor, and water in the production of other commodities, which generate or save foreign exchange.

In the DRC analysis a distinction is made between tradable and non-tradable commodities and between social and private prices. Tradables are inputs and products that are or can be traded in the international market. Non-tradables are domestic resources. Social prices reflect opportunity costs at the national level and private ones are the market prices received or paid by producers. Detailed crop budgets using social costs and prices and their differentiation into

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[31] Morris, M.L. 1990. *Determining Comparative Advantage through DRC Analysis: Guidelines Emerging from CIMMYT's Experience*. CIMMYT Economics Paper No. 1. Mexico, D.F.: CIMMYT.
[32] Monke, E. and S. Pearson. 1989. *The Policy Analysis Matrix*. Baltimore: Johns Hopkins University Press.

tradables and primary factors (domestic resources), therefore, need to be derived. Based on these budgets, indicators for the comparative advantage as well as those for many policy interventions can be computed through the construction of a Policy Analysis Matrix (PAM). Also, scenarios can be developed to detect the effect of relevant policy measures on the comparative advantage that a commodity may have.

For the derivation of social costs and returns, the following procedure is applicable:

- Tradables are estimated, based on world market prices. For imported commodities, the summation of the CIF price, port handling and charges, inland transport (up to the location of production) represents the social price at the farm level; or the Import Parity Price. For export commodities, the FOB price is used, adjusted by deducting port handling and other charges and inland transport to give the social price at the farm gate or the Export Parity Price.
- For domestic resources, the opportunity cost is used (value of the best alternative use of the resource).
- Adjustment of exchange rates is done, if necessary.
- Detailed crop budgets are constructed.
- Disaggregation of returns and costs into tradables and non-tradables is made and the PAM is derived. It is to be noted that most goods combine both tradable and non-tradable components e.g., imported goods, irrigation water, and transport. Separation of the two components is, therefore, necessary.
- Using the information in the PAM, indicators are calculated for the comparative advantage. In addition, many policy effects of producing the commodity are derived. The structure of the PAM is as follows:

	Tradables		Domestic Resources	Profits
	Outputs	Inputs		
Private Social	**A** **E**	**B** **F**	**C** **G**	**D = (A – B – C)** **H = (E – F – G)**
Policy Effects	**I = (A – F)**	**J = (B – F)**	**K = (C – G)**	**L = (I – J – K) = (D – H)**

Letters in the cells denote entries of the relevant values. Values at the private (financial) level are compared with those at the social level to derive various policy effects. The difference between the two rows is due to distortions in the market caused by policy interventions, given in the last row.

From the PAM, measures of economic efficiency and policy distortions can be calculated as:

1. Private Profitability, given by cell D.

2 Social Profitability, given by cell H.

3. Nominal Protection Coefficient (NPC) is calculated as the ratio (A/E). A value greater than one indicates subsidy of product price and a ratio less than one indicates output price taxation.

4. Effective Protection Coefficient (EPC) reflects the overall situation of protection with respect to all tradables (both products and inputs). It is calculated as the ratio (A – B)/(E – F). Again, a ratio higher than unity indicates overall subsidy and that less than unity denotes overall taxation. This is due to the fact that, while products may be taxed, inputs may be subsidized.

5. Total Net Policy Effects (NPE) equals Private less Social Profitability (as in cell L).

These five measures reflect policy effects on the commodity under consideration. Two indicators depict the comparative advantage. These are:

1. Value Added equals the value of output less the cost of tradable inputs at social prices, i.e., (E – F) in the PAM. High values indicate high returns to foreign inputs and vice versa.

2. Resource Cost Ratio (RCR), computed as the ratio of the cost of domestic resources at social prices to the value added [G/(E – F)], indicates whether the country or region has a comparative advantage in producing the commodity. It is interpreted as the value of domestic resources needed to earn one unit of foreign exchange, where both value added and cost of domestic resources are expressed in the same currency units. A value less than one implies that the value added per unit of product is larger than the value of domestic resources used in its production, thus indicating a comparative advantage. A ratio higher than one means that the value of domestic resources used to generate one unit of product is greater than the value added per unit of product. This indicates no comparative advantage, meaning that it would be better to import the commodity and use the domestic resources for the production of a better-earning commodity. If the RCRs are calculated for the enterprises in a region or country, their values can be compared to draw conclusions on the their competitiveness in using domestic resources.

In equation form:

$$\mathbf{C_i = (\textstyle\sum_r N_r X_{ri}) / (P_i Q_i - \textstyle\sum_j R_j Q_{ji})} \text{ ; where:}$$

C_i : Value of domestic resources used to save or generate a unit value added in activity (crop) *i*.
N_r : Opportunity cost of a unit of a domestic factor of production *r*.
X_{ri} : Quantity of factor r used in activity *i*.
P_i : Import or export parity price of tradable product *i*.
Q_i : Quantity of tradable product *i*.
R_j : Import or export parity price of tradable input *j*.
Q_{ji} : Quantity of tradable input *j* used in activity (crop) *i*.

The denominator in the equation gives the value added by activity *i* and the numerator calculates the economic value or cost of domestic resources used to produce Q_i. When both the numerator and denominator are in the same currency units, C_i measures the RCR, interpreted as follows:

$0 > RCR_i < 1$	implies comparative advantage of domestic production of the commodity since the value added per unit product is higher than the value of domestic resources engaged in its production.
$RCR_i > 1$	implies no comparative advantage since the value of domestic resources used to generate one unit of product is greater than the value added per unit of product.
$RCR_i < 0$	implies that the value of the tradable inputs used to generate one unit of product is higher than the product price (negative value added), i.e., no comparative advantage.

3.2 PROCEDURE FOR DATA COLLECTION AND ANALYSIS

The analysis was mainly based on data collected from primary sources though field surveys using structured questionnaires. Resort to primary information was justified by the paucity of disaggregated farm data on production operations in the identified agro-ecological zones. Moreover, it was important to base the analysis on updated information due to the changes in costs, prices and exchange rates associated with the shift to a more free-market mode and implementation of structural adjustment programs in the country. The farm surveys were conducted in each of Swazi Nation Land and Individual Tenure Farms where individual sampled producers were interviewed to collect the required information on existing crop mix, production practices, input use, input costs, crop disposal and product prices. However, secondary information was used for sampling procedures, time-series crop yields, and export and import prices of inputs and outputs. The sample design and procedure for crop budgets estimates are given in the following sections.

3.2.1 Sampling in Swazi Nation Land

In assessing the comparative advantage on SNL, crops were classified into activities with similar production conditions. This was due to the effect on the comparative advantage of crop yields, which are affected by management practices. Groups were defined by agro-ecological zone, type of crop and two technology indicators: crop mix and mechanization level, as shown below.

Agro-ecological Zones:
Highveld

Middleveld:
Lower Middleveld (ML)
Upper Middleveld (MU)

Lowveld:
East Lowveld (LE)
West Lowveld (LW)

Lubombo Range (LR)

➨ ➨

Crops:
Maize
Cotton
Groundnut

➨ ➨

Crop Stand:
Mixed
Sole

➨ ➨

Technology:
Mechanized
Non-mechanized

Purposive sampling was followed, based on stratification according to the six agro-ecological. The resulting six strata were Highveld, Upper Middleveld, Lower Middleveld, Western Lowveld, Eastern Lowveld, and Lubombo Range. All six zones were sampled, within which the four administrative regions of the country (Manzini, Shizelwini, Hhohho, and Lubomba) were represented. Further, a fair geographical distribution of the sample was taken into consideration to cover the enumeration areas developed by the Agricultural Survey Unit (ASU) of the Central Statistics Office (CSO). The final sample was drawn from those enumeration areas that are contained in the samples used by the CSO in its agricultural surveys of the 1994/95 and 1995/96 seasons. This had the advantage of making use of the data already available from these surveys such as identification information of the sampled homesteads and farms, crops and crop mixtures, and the area planted. Moreover, CSO enumerators who were entrusted with farmers' interviews were already acquainted with the selected enumeration areas and had established rapport with the local authorities as well as with the sampled farmers. Sample selection was made in consultation with the head of the ASU/CSO. Later, some amendments were made in the sample due to logistical pre-requisites. All of the crops grown by the sampled farmers were included in data collection. The sampled numbers of farmers are shown in Table 3.1 and their locations in Map 3.1.

Table 3.1. Number of Sampled Farmers for the Survey in SNL Zones

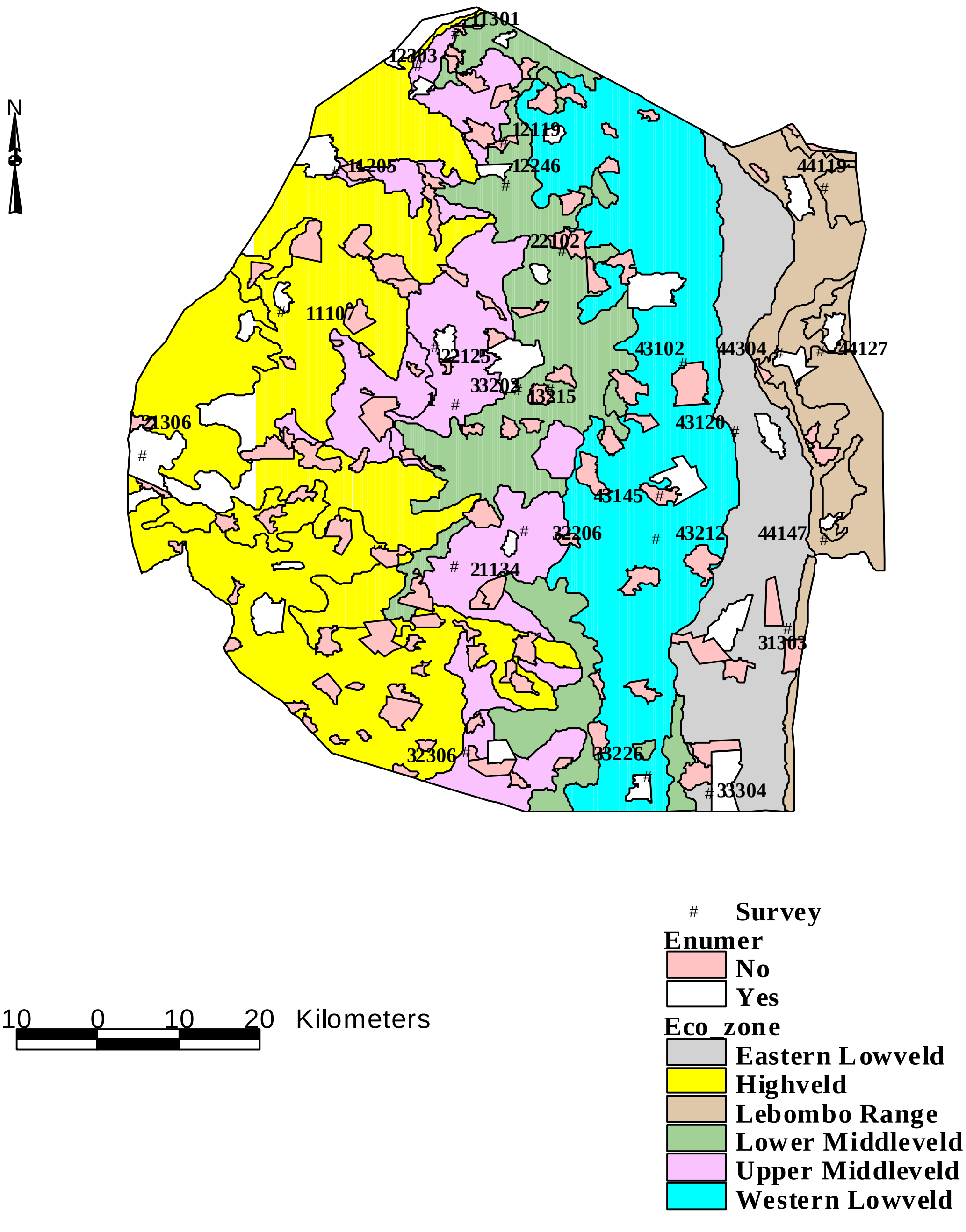
Zone	Sample Size
HV	37
MU	6
ML	35
LE	25
LW	30
LR	35

3.2.2 Sampling in Individual Tenure Farms (IRF)

For the Individual Tenure Farms, sampling was based on stratification according to four agro-ecological zones: Highveld, Middleveld, Lowveld, and Lubombo Range. This was due to the fact that the available records of the ITF farms was not disaggregated for the Middleveld and Lowveld into the two sub-zones which were considered in the SNL. A list of the ITF and the crops grown were obtained from the CSO, based on the Swaziland Census of Agriculture, 1992/93 (Central Statistics Office, undated[33]).

[33] Central Statistics Office, undated. *Swaziland Census of Agriculture, 1992/93 - Title Deed Farms*. Mbabane.

Map 3.1. Survey Sites on Swazi Nation Land per Agroecological Zone



The number of farms and firms growing maize, cotton, sugar cane and pineapple in each of the major zones were as in Table 3.2.

Table 3.2. Number of Farms Growing Different Crops in the Four Agro-ecological Zones

Crop	Highveld	Middleveld	Lowveld	Lubombo	Total
Maize	66	81	25	6	178
Cotton	3	4	20	1	28
Sugar Cane			16		16
Pineapple		2			2
Total	69	87	61	7	224

Sampling for these crops was made based on the individual grown crops. In this regard, farms growing each crop were determined as a sampling frame from which farm samples were drawn. Since different areas of crops, especially of maize and cotton, are grown in various farms in the different zones, sampling was based on representation of the four zones and arbitrary selection according to the reported ranges of farm size. However, zones in which a crop was not grown, or its area was insignificant, were dropped out of the sample for that crop. Since sugar cane production was confined to the Lowveld and that of pineapple to the Middleveld, sampling for these crops was restricted to these two zones.

Further, two more crops were found important to include, namely, vegetables and citrus fruits. However, difficulties were encountered for probability sampling of the farmers engaged in their production. Vegetables were quite heterogeneous in type, crop mixtures, and areas. Of these, cabbage, carrots, and tomatoes were identified as the most important crops. A sample of farmers growing sizable areas of vegetables was taken, but the resulting crop mixture revealed that cabbage was the most common crop in the selected farms while the frequencies of the other two vegetables was low. The analysis was accordingly confined to cabbage, which is actually a rapidly expanding crop in Swaziland, forming both an import substitute and an export crop to neighboring foreign markets.

The resulting sampled farms growing maize, cotton, sugar cane, pineapple and vegetables were as presented in Table 3.3.

Table 3.3. Number of Sampled Farms for Five Crops in the Four Agro-ecological Zones

Crop	HV	MV	LV	LU	Total
Maize:					
Large	1	3	2	1	7
Medium	3	5	3	2	13
Small	8	6	3	2	19
Total	12	14	8	5	39
Cotton:					
Large			5		5
Medium		2	5		7
Small	2		1		3
Total	2	2	11		15
Sugar Cane:					
Large			2		2
Medium			2		2
Small			6		6
Total			10		10
Pineapple:					
Large		1			1
Medium		1			1
Total		2			2
Vegetables (cabbage)		8	1		9

On the other hand, no account could be obtained on the number of orchards, but the statistics on crop areas reveal that citrus fruits form the most important group of fruit crops that are highly exported. Grapefruits and oranges are the two widely grown citrus fruits, occupying about 2,700ha in 1993/94 and concentrated in the Lowveld and Middleveld zones. Most of the met growers of citrus fruits had very small areas. The analysis for grapefruits and oranges was, therefore, based on information collected from one big grower running 438ha of grapefruit and 193ha of oranges. This information was supplemented by secondary data on yields and prices reported in the available statistical records. The locations of the sampled farms are depicted in Map 3.2.

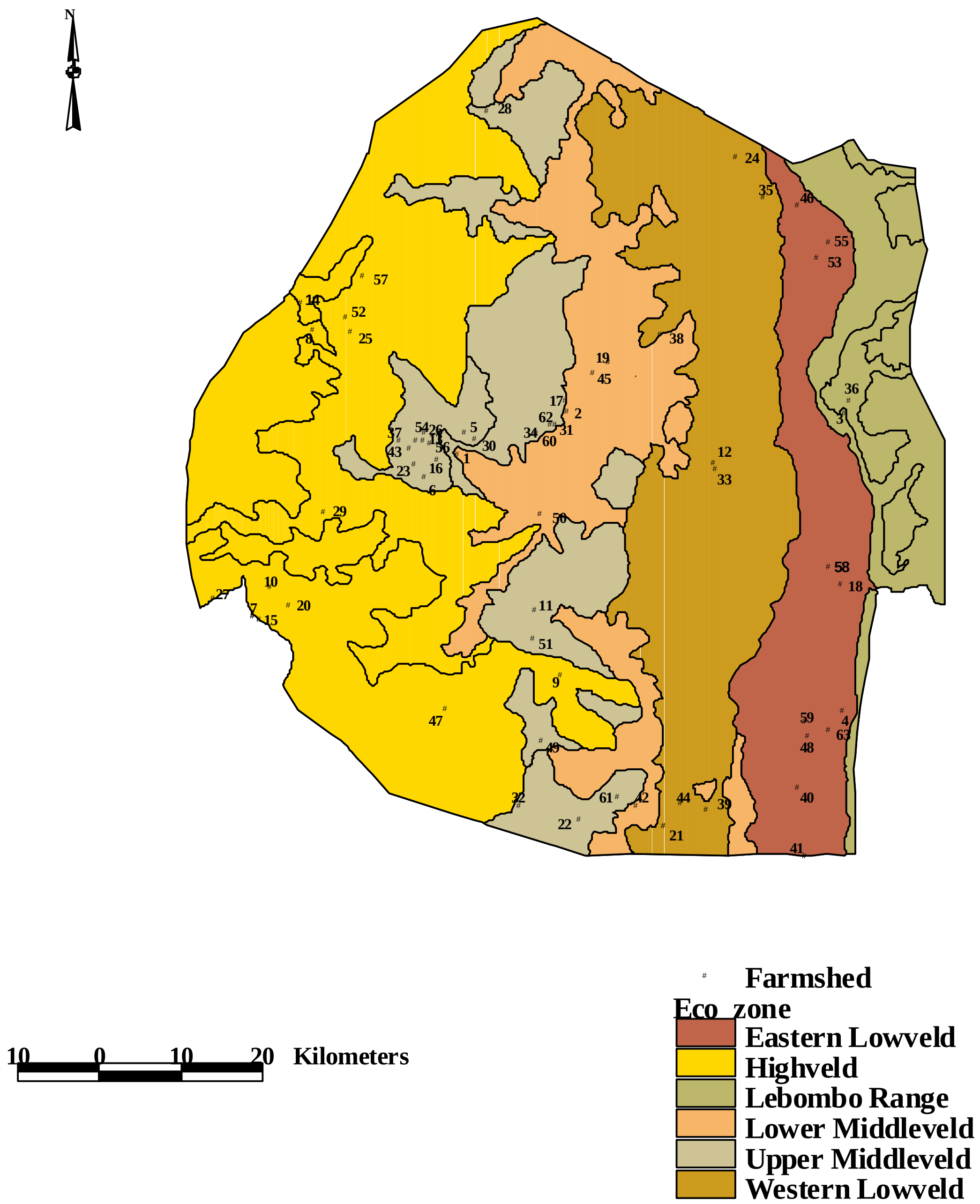
3.3 PROCEDURE AND ASSUMPTIONS FOR CROP BUDGETS ESTIMATES

Crop budgets were established for each type of activity in each of the identified agro-ecological zones. Crop activity in the SNL was defined by zone, type of crop, and production technology, as mentioned earlier. In the ITF sector, all crops were grown in sole stands and no distinct technology levels were identifiable since growers are mostly oriented towards the market and the use of machinery and chemical inputs such as fertilizers was common. Crop activities were therefore delineated according to the type of crop and agro-ecological zone, as will be described later.

Private crop prices were taken as the average prevailing in each zone. No account of maize prices was given in the SNL sector since farmers invariably made no maize sales and the produce was totally for domestic consumption. One private price of E629/t was therefore used for maize in this sector as reported in a central market in the country. In the ITF sector, different average maize prices were used as mentioned by farmers in each zone. They were E741/t in the Highveld and E630/t in each of the Middleveld and Lowveld. Other crops in both sectors were highly localized with respect to zone and one financial price applied to each crop. Social prices were estimated according to the import or export parity prices depending on whether the crop is a potentially an import or export crop. International prices were adjusted by freight, port handling charges and transportation costs to arrive at a producer's price as explained in Chapter 2. Since South Africa forms Swaziland's major trade partner, estimates of the border price of most of the crops as well as traded inputs were based on the situation of freight between the two countries. Due to the small area of the country, which renders differences in inland transportation costs negligible, one social price was determined for each crop. The social prices of maize, cotton, and groundnut were derived in this manner. For other crops, some adjustments were necessary to make.

For sugar cane, the sugar mills give a price for sucrose. The cane price was computed according to the percent sucrose content after adjusting for transport costs. At the social level, since there is no world market for cane, the world market sugar prices were adjusted to arrive at a cane border price subject to the sugar extraction rate, milling cots and freight and handling charges. The world market price of raw sugar (Caribbean ports) varied between $203 and $297/t in the period 1992-1996. The average of $253/t in this period was used in the computation. Swaziland, however, obtains higher prices for its sugar under Lome convention. A 60% higher price was assumed for Swaziland's sugar prices. The F.O.B. price was therefore adjusted to reach $397.8/t, which was highly in line with the surge in international sugar prices in 1996. For citrus fruits, the export value was taken as a guide to estimate F.O.B. prices subject to adjustments for customs, freight, and transport charges.

Map 3.2. Survey Sites on Individual Tenure Farms per Agroecological Zone



The price of oranges was about 5% less than that of grapefruit in European markets; a relationship that was used to determine the oranges F.O.B. price. Similarly, a price of $231/t was employed for cabbage in light of export values. With regard to pineapple, the price of fresh fruit rather than juice or canned pineapples was used due to the existence of a market for fresh fruits in the region, especially with South Africa. The resulting private and social crop prices are shown in Appendices 1 and 2. Crop yields were the averages reported by farmers and are presented in relevant parts of the report.

The computations largely followed the steps adopted by Hassan and Faki (1993)[34]. Gross returns of crops were determined by the product of average yield and product price. Variable production costs were defined by five major categories, namely machinery, oxen, skilled labor, unskilled labor, and material inputs. In addition, costs of borrowed capital and taxes (at the financial level) were included. The private and social costs of inputs and services were derived on per ha basis depending on the survey data. Technical coefficients were determined for the inputs of machinery, oxen, labor, and material inputs and multiplied by their respective prices. A deviation from this was experienced in the case of the inputs of pineapple and the chemical inputs of sugar cane where, the data was in the form of financial expenditures. Technical coefficients were therefore estimated by dividing the reported expenditure by the ruling private prices of inputs, and the resulting coefficients were used to compute the social input costs. Both technical coefficients and input prices were as derived from the survey data in each agro-ecological zone. The social costs of most inputs were derived in a way similar to that of product prices where import parity prices were determined for machinery services, fertilizers and herbicides. Many estimates were, however, necessary to make with respect to the international prices of chemicals which were numerous, diverse, and had different price levels. Moreover, international prices of some chemicals were hard to detect. While an average estimated international price was used for the reported groups of herbicides and insecticides, that of many types of chemicals, especially in pineapple and sugar cane production, was derived based on the private prices after adjusting for customs and dealers' profits. The cost of machinery use at the social level was computed according to a disaggregation into fixed and variable components as followed by Hassan and Faki (1993).

The social price of labor was assumed to simulate the private one due to the presence of a competitive labor market. Although the labor wages differ among regions and enterprises, the difference was mostly small and was affected by location and the fact that large estates offer higher prices than individual farmers do. Due to the considerable unemployment and the limited opportunities for agricultural labor to find alternative jobs, the ruling wages offer a reliable representation of the social labor wages.

The coefficients and prices of different inputs are presented in Appendices 3 and 4.

The interest rate on borrowed capital was taken as the prevailing market rate, which was 18% and was considered to apply for both private and social analyses due the highly commercialized credit market. However, farmers in the SNL receive a small subsidy of 1% lower interest which was adjusted on the social side to match the 18% market rate. Information on credit was variable among producers. In the SNL sector maize production highly depended on family labor and credit needs were taken as 30% of the production. Cotton farmers in this sector had more credit needs, especially for inputs, which were estimated at 50% of the production costs. For the ITF sector, a unified credit of 30% of costs was assumed for all crops.

Taxes were included at the financial level in the ITF sector. There was, however, high reluctance of producers to provide information on this item and assumptions were therefore inevitable. The tax payment was assumed at 10% of the gross crop returns. In the SNL, no taxation is levied.

[34] Hassan, R.M. and H. Faki (1993*). Economic policy and technology determinants of the comparative advantage of wheat production in Sudan*. CIMMYT Economics Paper No. 6. Bangkok, Thailand.: CIMMYT.

In spite of the existence of a land market, land renting is not common in Swaziland, but some farmers reported renting part of their holdings. At the private analysis level, the land cost was therefore taken as zero. At the social one, an average land rent was estimated for the rainfed areas according to the few figures provided by some farmers, which was E150/ha. In light of this figure, a social cost for irrigated land was estimated at E500/ha, taking the differences in the value of land under the two systems into consideration. Errors, which may have occurred due to the use of a somehow arbitrary social cost of land, were largely offset through a sensitivity analysis that considered varying land rents. An opportunity cost of land according to net returns from the best alternative use was not employed due to the ambiguity in actual available opportunities for land shifts from one use to another, as will be discussed in the sensitivity analysis part.

With respect to irrigation water, the SNL sector operates under rainfed conditions, implying zero cost for water at both private and social levels. For the ITF, the value of water at the two analysis levels was incorporated in the cost of land. Water per se is naturally a free good, but the costs of water provision were determined at both private and social levels similar to the procedure used for the calculation of the machinery cost.

The exchange rate, which was employed in the determination of social costs and social crop prices, was taken as E4.6/$US. This was the rate prevailing at the commencement of the analysis during late 1996. Exchange rates were subject to considerable fluctuations prior to and after this date, following variations in the value of the South Africa Rand. There was, however, no parallel exchange rate market that would instigate the calculation and use of a shadow exchange rate. While the nominal exchange rate may differ from the real one, information to compute the latter was not readily available. Accordingly, and because of the existence of a fairly free-market for the exchange rate, it was assumed that the nominal exchange rate simulates its shadow level. To account for discrepancies, the employed exchange rate was varied in a sensitivity analysis together with other variables.

3.4 SOME CONSIDERATIONS IN THE ANALYSIS PROCEDURE

Analysis methods followed the same lines of those described above. However, the preparation of budgets of some crops required some special considerations. For the citrus fruits, budgets were prepared subject to four different periods of the life span of trees. These were an initial stage of two years during which only costs were incurred (including those of tree establishment), a second period of three years during which yields are in a rising mode and returns start to accrue, a third period of seven years of stable yields, and a last one of three years during which yields are declining. The flow of yields, costs, and returns were determined for each period and the grand averages of these variables were weighted by the number of years in each period. On the other hand, irrigation costs for orchards as well as for vegetables were calculated by an estimation of fixed and variable costs, similar to the procedure used for the computation of machinery costs.

Pineapple budgets were developed taking into consideration that the crop takes two years to yield a mother crop and another year to harvest a ratoon crop after which the crop cycle comes to an end. While costs fall during the three years, the two yield figures had to be averaged over the three-year crop period. Unlike the case of sugar cane, the budgets of pineapples were based on fresh rather than on processed fruits. This was due to the availability of fresh-fruits market in the region and worldwide.

Sugar cane budgets were computed as averages of the large estates and private small growers weighted by the areas grown under each type. Similarly, the budgets of pineapple were estimated from the weighted average figures of one large commercial grower and a cooperative farm.

Other adjustments included the estimation of the social costs of many chemicals on which world market prices were difficult to obtain based on their local prices adjusted for customs and taxes. The inputs included a diversity of insecticides, herbicides and growth regulators in the production of sugar cane and pineapples. Possible deviations from international prices were largely captured within the sensitivity analysis, which included variation in social prices of products and inputs.

On account of many inevitable assumptions made for the construction of the crop budgets and the expected variation in many of the variables, ample sensitivity analyses were conducted. These analyses traced the effect of the variation of crop yields, world crop market prices, exchange rates, and land opportunity cost on profitability and competitiveness of the crops under study. The type of sensitivity analysis depended on the situation where break-even values were computed in some cases, competitive threshold levels in other cases and the effect of changed values of the variable in a third situation. These are discussed in relevant sections of the report.

4. Competitiveness of Agricultural Production on the Swazi Nation Land Sector

4.1 CROPPING STRUCTURE

The survey results showed that maize was the dominant crop, grown by an average of 86% of the farmers in all zones, while other crops had small area shares (Figure 4.1). In some zones, such as Upper Middleveld, Highveld, and Lubombo Range, maize is grown by over 90% of the farmers (Table 4.1).

Figure 4.1. Percent Average Areas of Crops on SNL

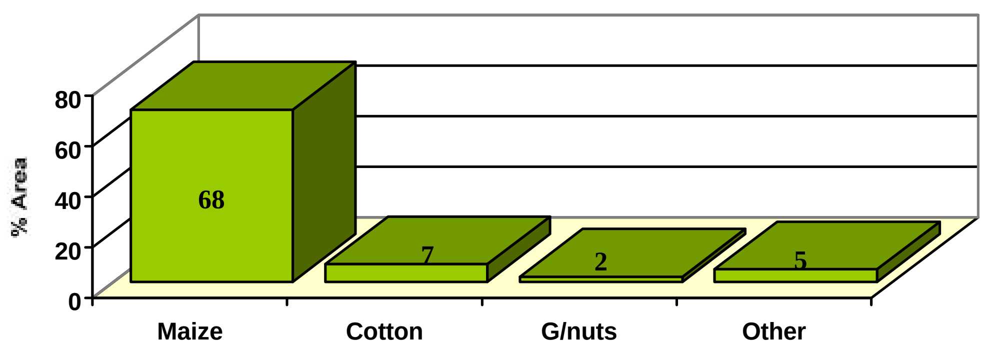


Table 4.1. Extent of Cultivation of Various Crop Activities in Different Agro-ecological Zones (% of Farmers)

Crop Activity †	HV	MU	ML	LE	LW	LR	*Average*
Maize Mixed (M0)	13	0	13	12	18	14	12
Maize Mixed (M1)	34	100	37	0	32	11	36
Maize Sole (M0)	16	0	13	15	12	39	16
Maize Sole (M1)	34	0	16	42	18	28	23
Cotton Sole (M1)	0	0	0	19	9	0	5
Cotton Sole (M0)	0	0	0	8	3	6	2
Groundnuts Sole (M1)	0	0	13	0	0	0	2
Other	3	0	8	4	9	3	5

† M0 = non-mechanized; M1 = mechanized land preparation.

Cotton and groundnuts followed maize in importance. Other crops, which were mainly mixed with maize, were, on average, grown on 5% of the holdings. They, however, acquired more importance in the Lowveld and Middleveld zones.

In more than half of the maize-producing homesteads, maize was grown in mixture with other minor crops. Pumpkins was the dominant mix crop, but yams, cowpea, melons, groundnuts, and jougobeans were grown in mixture with maize. A two-crop mix was reported in more than half of the mixed-crop mode of production, followed by a three-crop mixture (30%). Sole maize was cultivated by about 40% of the sampled farmers and was more dominant in East Lowveld, Highveld, and Lubombo Range. Cotton production was concentrated in the Lowveld, especially in its eastern part, and was mostly grown as a sole crop. Groundnut, grown in sole stands, was confined to the Lower Middleveld zone. The majority of farmers applied mechanical land preparation for all three crops, although non-mechanized tillage was substantial with dependence on animal draft or manual labor.

Average areas of the crops grown are depicted in Table 4.2. Maize areas revolved around one ha, with relatively larger holdings in Lower Middleveld. Cotton enjoyed larger holdings, while the average area of groundnuts was relatively small. Generally, such small holdings are typical of this subsistence zone.

Table 4.2. Average Areas of Various Crop Activities

Crop Activity	HV	MU	ML	LE	LW	LR	Average
Maize Mixed (M0)	0.709		1.344	0.432	0.642	0.264	0.675
Maize Mixed (M1)	1.470	0.928	2.557		1.151	0.397	1.301
Maize Sole (M0)	1.230		0.711	0.466	1.130	0.315	0.770
Maize Sole (M1)	0.680		1.064	1.177	0.828	0.376	0.825
Cotton Sole (M0)						0.917	1.148
Cotton Sole (M1)				2.119	1.883		2.001
Groundnuts Sole (M1)			0.095				0.095
Other	0.124		0.412	0.818	0.398	0.052	0.361

Under limited off-farm employment opportunities, productivity needs to be high in order to support the relatively large-size farming families. Other alternatives are intensive cropping that allows the utilization of land for more than a crop per year and efficient use of rangeland for livestock rearing. However, according to the available statistics, fallowing of up to 19% is practiced in this zone, implying low crop intensities. This has been partly due to the association of cropping with the rainy season and the limited opportunities for irrigation.

Average crop yields in the 1995/96 season were generally low (Table 4.3). Maize yields under different production conditions ranged between 0.376 and 2.519 t/ha, except in the Lower Middleveld zone where an exceptional yield level approaching 4.5 t/ha was reported.

The overall average yield was 1.318 t/ha. Mixed maize under mechanized tillage produced higher yields than that under no mechanization or the one produced in sole stands. This was most probably due to the beneficial effect of the associated crop, being legume in many situations. It is to be noted that the higher grand average yield of sole maize was inflated by the exceptional yields in the Lower Middleveld. Cotton yield averaged 0.417 t/ha while that of groundnuts was 0.891 t/ha.

Table 4.3. Average Yields of Different Crop Activities (t/ha)

Crop	HV	MU	ML	LE	LW	LR	Average
Maize Mixed (M0)	0.990		0.386	1.080	0.564	1.510	0.906
Maize Mixed (M1)	2.519	0.862	1.334		1.120	2.423	1.652
Maize Sole (M0)	0.584		4.498	1.426	0.376	0.940	1.565
Maize Sole (M1)	0.993		1.645	0.476	0.880	1.747	1.148
Average Maize	**1.272**	**0.862**	**1.966**	**0.994**	**0.735**	**1.655**	**1.318**
Cotton Sole (M0)						0.305	0.305
Cotton Sole (M1)				0.419	0.639		0.529
Average Cotton				**0.419**	**0.639**	**0.305**	**0.417**
Groundnut Sole (M0)			**0.891**				**0.891**

For all crops, a high potential exists to boost yields. This is indicated by the high yields realized under experimental conditions and in demonstration farms following improved production practices. Reported yields of recommended maize germplasm in multi-location trials (6 locations) averaged 4.32, 3.854 and 4.83 t/ha in seasons 1993/94, 1994/95 and 1995/96, respectively (results from Malkerns Research Station). Moreover, many lines exceeded these averages in different locations, indicating a greater potential to boost maize yields.

4.2 PROFITABILITY AND POLICY INTERVENTIONS

4.2.1 Private Profitability

Results of crop budgets reveal variable social profitability of the crops grown in the identified agro-ecological zones (Table 4.4).

Table 4.4. Private Profitability of Crop Activities in Various Agro-ecological Zones (E/ha)

Crop	HV	MU	ML	LE	LW	LR	Average
Maize Mixed (M0)	144		-44	-22	-91	114	20
Maize Mixed (M1)	862	-140	372		27	87	242
Maize Sole (M0)	53		2106	59	-204	-49	393
Maize Sole (M1)	-89		373	-161	-32	17	22
Cotton Sole (M0)						-629	- 629
Cotton Sole (M1)				151	369		260
Groundnut Sole (M0)			1047				1047

Mixed mechanized maize enjoyed more consistent positive private profitability evident in four out of five zones in which this activity was practiced. This was in consistency with the relatively higher yields obtained. It is to be noted that the actual profitability of mixed maize under both mechanized and non-mechanized modes might have been even higher than the reported figures due to the extra expected benefits from the mix crop with which it was associated. This, however, depends on whether the mix crop brings positive margins over its cost of production. Cotton was generally more profitable than maize in the zones where these crops are grown. An exception was the limited non-mechanized cotton in Lubombo Range, which had negative profitability. Groundnuts had substantially higher profitability in the Lower Middleveld. Both cotton and groundnut reveal an encouraging potential. On the other hand, sampled farmers in the Lower Middleveld had generally enjoyed higher profitability of their crops than those in other zones.

4.2.2 Social Profitability

Social profitability, as depicted in Table 4.5, reflects a general loss in maize production at the national level except in the Lower Middleveld. Compared with the situation of private profitability, this implies that the net policy effects tend to increase private profitability under the existing management practices and realized yields of many maize activities in most agro-ecological zones.

Table 4.5. Social Profitability of Different Crop Activities (E/ha)

	HV	MU	ML	LE	LW	LR	Average
Maize Mixed (M0)	-91		-232	-147	-297	-84	- 170
Maize Mixed (M1)	678	-218	197		-192	-87	76
Maize Sole (M0)	-253		1719	-153	-507	-334	94
Maize Sole (M1)	-167		101	-337	-257	-167	- 194
Cotton Sole (M0)						-457	- 457
Cotton Sole (M1)				490	784		637
Groundnut Sole (M0)			269				269

On the other hand, both cotton and groundnuts were socially profitable, except for non-mechanized cotton in Lubombo Range. However, the social profitability of cotton was higher than its private one, indicating indirect taxing policy effects while that of groundnuts was lower, implying indirect subsidy. Comparing both crops, cotton seemed to be a more efficient earner at the national level than groundnut, as reflected by the higher positive margins of the former.

4.2.3 Policy Interventions in Tradable Commodities

Policy interventions can be traced by the values of the nominal protection coefficients (NPC) of the grown crops and the effective protection coefficients of different activities. The NPCs were 1.03, 0.75, and 1.21 for maize, cotton and groundnut, respectively. The NPC for maize shows that the maize price received by farmers was comparable to its import parity price, which was indicative of limited intervention. That of cotton indicates some taxation while the NPC for groundnuts reveals considerable subsidy. The effective protection coefficients (EPCs) are shown in Table 4.6 for the various activities in the six zones.

Table 4.6. Effective Protection Coefficients of Different Crop Activities (EPC)

Crop Activity	HV	MU	ML	LE	LW	LR
Maize Mixed (M0)	1.17		1.02	0.99	1.02	1.00
Maize Mixed (M1)	0.99	0.80	0.97		0.82	0.87
Maize Sole (M0)	1.02		1.02	1.00	1.01	0.96
Maize Sole (M1)	0.84		0.91	0.23	0.76	0.81
Cotton Sole (M0)						-0.32
Cotton Sole (M1)				0.59	0.63	
Groundnut Sole (M0)			1.23			

The EPCs for maize show low intervention or taxation on tradables, depending on the production mode. There was a taxation tendency for mechanized maize applying tax levies on machinery use. Intervention in non-mechanized maize was either limited or, as in many cases, the crop was subsidized. Cotton tradables were invariably taxed as evident from its NPCs of less than one. Groundnut, on the other hand, was clearly subsidized.

4.3 COMPARATIVE ADVANTAGE

The comparative advantage of crop activities is depicted by the RCRs in Table 4.7. With reference to its RCRs, maize had a low comparative advantage except in the Lower Middleveld, but a fair one under mechanized cropping. The low competitiveness of maize was mainly attributed to its low yields. On the other hand, both cotton and groundnuts were competitive in their respective production systems, as revealed by their RCRs of less than unity.

Cotton under mechanized tillage was highly competitive as compared to groundnuts. However, cotton production in Lubombo Range had clearly no comparative advantage.

Table 4.7. Resource Cost Ratios of Crop Activities.

Crop Activity	HV	MU	ML	LE	LW	LR
Maize Mixed (M0)	1.20		2.30	1.31	2.07	1.11
Maize Mixed (M1)	0.48	1.69	0.69		1.48	1.10
Maize Sole (M0)	1.88		0.30	1.22	4.06	1.91
Maize Sole (M1)	1.72		0.87	4.08	1.97	1.32
Cotton Sole (M0)						3.06
Cotton Sole (M1)				0.49	0.48	
Groundnut Sole (M0)			0.85			

4.4 SENSITIVITY OF THE COMPARATIVE ADVANTAGE

The two major factors that affect the comparative advantage are crop yields and international commodity prices. The effect of the exchange rate may also come into consideration, especially if there are considerable deviations from the real exchange rate. Although it has been assumed that the ruling exchange rate simulates the real one, the exchange rate variation was considered to monitor its effects, especially that no attempt was made to estimate the real exchange rate. Various scenarios were developed for the sensitivity analysis. First the RCRs were recomputed at average yields of the period 1992/93-1994/95 and, further, break-even values of crop yields, world market prices and exchange rates were computed for those activities, predominantly those of maize, that revealed no comparative advantage. The break-even figures represent the values of those variables at which the RCRs are equal to unity; i.e. values at which the activity starts to become competitive in using domestic resources.

4.4.1 Comparative Advantage with Average Crop Yields

In the above analysis, the comparative advantage of the crops under consideration has been estimated according to the crop yields realized in the 1995/96 season. It is, however, worthwhile to examine the comparative advantage at average yields in each of agro-ecological zones, which would represent a proxy to average conditions. Since time-series yield records are available for the main four agro-ecological zones, the 1995/96 season's figures for the sub-zones were averaged to derive crop budgets and RCRs for these main zones. Then, the RCRs were computed using the average yields in the three-year period 1992/93-1994/95. Table 4.8 shows the maize yields and RCRs in 1995/96 as compared with those of the three-year average in SNL in the four major zones.

Table 4.8. Comparison of Maize Yields and RCRs in 1995/96 and the Average in 1992/93-1994/95 in the Main Agro-ecological Zones

Item	Highveld	Middleveld	Lowveld	Lubombo Range
Maize Yields (t/ha) in:				
1995/96	1.27	1.414	0.865	1.66
Average (1993-1995)	1.75	1.615	0.907	0.79
RCR with:				
1995/96 Yields	0.99	0.83	1.75	1.27
Average Yields	0.67	0.70	1.63	7.88

Trend average maize yields were higher than those in 1995/96 in both Highveld and Middleveld zones, comparable in the Lowveld and substantially lower in Lubombo zone. However, the comparative advantage, though varying with the yield level, did not change. It improved but remained less than one in the tow former zones, and worsened but remained higher than one in the two latter ones. This implies that the Highveld and Middleveld would produce competitive maize under good management practices, while the Lowveld and Lubombo Range are on average noncompetitive at the prevailing yield levels.

A similar situation was depicted for cotton (Table 4.9). Yields were higher in 1995/96 than their three-year average, but judgment of the comparative advantage did not change. Yet, it is apparent that a moderate improvement in cotton yield in Lubombo Range will be conducive to its competitiveness. The DRC for cotton is relatively more sensitive to its yields than that of maize.

Table 4.9. Comparison of Cotton Yields and RCRs in 1995/96 and the Average in 1992/93-1994/95 in the Main Agro-ecological Zones

Yield Level	Highveld	Middleveld	Lowveld	Lubombo Range
Cotton Yields (t/ha) in:				
1995/96	-	-	0.529	0.305
Average (1993-1995)	-	-	0.391	0.320
RCR with:				
1995/96 Yields	-	-	0.48	3.06
Average Yields	-	-	0.69	2.57

Groundnut yields, reported in Middleveld, averaged 0.891 for 1995/96 and 0.568 in the period 1992/93-1994/95. The DRC ratios were respectively 0.85 and 1.41 in the two situations. With average yields, groundnuts would not be competitive and its yields need to be boosted for a comparative advantage situation.

4.4.2 Break-even Yields

Break-even yields of the non-competitive activities were derived. These yields, as well as the actually obtained ones under different production modes in the various zones are displayed in Table 4.10 for comparison.

The calculated break-even yields ranged between 0.8 and 2.1 t/ha except for mixed mechanized maize in Lubombo Range where the break-even yield was 2.58 t/ha. These yields represent attainable targets since their levels were realized or exceeded by some farmers in these zones under the respective production systems. For cotton, the only non-competitive activity was the non-mechanized crop in Lubombo Range. Its break-even yields of 0.468 t/ha represent a challenging target, given the trend yields in the zone where cotton production does not seem to enjoy a comparative advantage. However, if potential yields of about 1.2 t/ha are approached, cotton will form a competitive enterprise in Lubombo.

Table 4.10. Break-even Yields (at unity RCRs) of Different Crop Activities

Activity/Item	HV	MU	ML	LE	LW	LR
Maize Mixed (M0):						
Realized Yield	0.990	-	0.386	1.080	0.564	1.510
Break-even Yield	1.185		0.817	1.353	1.116	1.665
Maize Mixed (M1):						
Realized Yield	-	0.862	-	-	1.120	2.423
Break-even Yield		1.268			1.477	2.583
Maize Sole (M0):						
Realized Yield	0.584	-	-	1.426	0.376	0.940
Break-even Yield	1.054			1.710	1.317	1.561
Maize Sole (M1):						
Realized Yield	0.993	-	-	0.476	0.880	1.747
Break-even Yield	1.570			1.102	1.357	2.057
Cotton Sole (M0):						
Realized Yield						0.305
Break-even Yield						0.468

4.4.3 Competitiveness under Improved Management Practices

The estimated break-even yields in Section 4.4.2 imply targeted yield improvement at zero or negligible cost such as better synchronization of the sowing dates, and use of suitable cultivars and optimum plant populations. Improved management practices, on the other hand, would be associated with higher yields but also higher production costs than the traditional ones. It is therefore worthwhile to estimate crop competitiveness under improved practices, which will simulate the potential situation. Analysis was conducted with research yields and recommended management practices for maize, cotton, and groundnuts for which research data is available.

For maize, on-farm and on-station trial results were used to recalculate its comparative advantage. The two technology levels were associated with different levels of management, especially tillage operations and the amount of input use. Standard recommended management practices in each agro-ecological zone were used in the analysis in association with the on-station trial yields and represented high-technology level. The on-farm trial level, representing, medium technology, was associated with an estimated medium management practices in light of information compiled by the Swaziland Development and Savings Bank. Based on the availability of research data, average on-farm trial yields in the period 1986/87-1993/94 were used for the medium technology situation and average on-station trial yields in the period 1982/83-1995/96 were employed for the high technology case. In both situations, yields represented those of the check cultivars in those trials due to their long-term use by farmers. Due to the highly variable frequency in the conduct of on-farm trials, average yields in the various agro-ecological zones were derived from variable numbers of yield trials. For on-station trials, however, no data was readily available from on-station trials in the Lowveld or Lubombo Range.

Cotton improved yields of Albacala 72b cultivar as obtained from the district variety trial under rainfed conditions averaged 1.47 t/ha in the period 1988/89-1990/91. Yields of on-farm trials in 1990/91 were 1.332 t/ha and those of on-farm observation plots were 1.395 t/ha in the same season. The three-season average yield was, however, used in the high-technology scenario because of the longer time-period.

With respect to groundnuts, on-station trials gave an average yield of 0.941 t/ha for the check cultivar in the period 1987/88-1990/91, which represented the improved-technology scenario in the sensitivity analysis.

Crop yields and technical production coefficients under improved technology are given in Appendix 8. The main policy indicators and RCRs with the improved technology scenarios are shown in Table 4.11.

With improved technology, the performance of maize would substantially improve resulting in a comparative advantage per se. However, its competitiveness would still be lower than other crops, especially in the dry Middleveld areas, Lowveld and Lubombo Range. With medium technology, maize competitiveness would highly improve in the Highveld and moist areas of the Middleveld. Under high technology, the improvement over medium technology was negligible in these two zones, implying that extra benefits due to higher yields would be eroded by the increase in production costs. It is to be noted that, although the average trial yields in the Highveld and moist Middleveld were comparable, the higher requirements of inputs in the former resulted in the lower comparative advantage there. It becomes evident that these two zones boast the potential for competitive maize in Swaziland if yields exceed 3.5 t/ha.

Table 4.11. Policy Indicators and RCRs of Maize, Cotton, and Groundnuts under Improved Technology

Crop/Technology	PP (E/ha)	SP (E/ha)	EPC (Ratio)	RCR (Ratio)
Maize:				
On-farm Trials:				
HV	465	478	1.11	0.61
MU	647	672	1.10	0.53
ML	-53	-3	0.99	1.01
LV†	277	290	1.07	0.70
LU	242	273	1.07	0.72
On-station Trials:				
HV	520	661	1.10	0.60
MU	694	867	1.08	0.54
ML	56	260	0.98	0.76
Cotton (LV)	1084	2711	0.61	0.26
Groundnut (MV)	1120	926	1.19	0.46

† This represents an average for LE and LW due to the absence of disaggregated research data.

Cotton will enjoy high comparative advantage under high technology, with a paramount RCR of 0.26. The comparative advantage of groundnuts would tremendously improve, rendering the crop highly competitive. Both crops gain advantage over maize with respect to the use of domestic resources, as well as their private profitability. Policy interventions can be depicted as subsidies to both maize and groundnuts and considerable taxation on cotton.

4.4.4 Break-even World Market Prices

The world price of yellow maize US No. 2 delivered at US Gulf averaged $102 per ton in the 8-year period 1987-1995. With a standard deviation of $10.6, the price variation has been relatively low in this period. Although a freight charge of about $50 would apply to the international maize trade, most of Swaziland's maize imports are from the RSA, implying much lower freight charges. Based on this situation, the CIF price of maize was taken as $115 per ton. Similarly, the CIF prices of cotton and groundnuts were estimated at $1,572 and $600 per ton, respectively. Within the sensitivity analysis, changes in the world market prices reflect strongly on the competitiveness of these crops. In order to capture the effect of price changes, break-even prices of maize and cotton (at which the DRC=1) were calculated for the noncompetitive activities of these crops (Table 4.12).

Table 4.12. Break-even Prices (at which RCR=1) for Maize and Cotton Produced under Different Production Modes

Activity/Item	HV	MU	ML	LE	LW	LR
Maize Mixed (M0)	132		229	141	215	125
Maize Mixed (M1)		163			147	122
Maize Sole (M0)	197			135	370	182
Maize Sole (M1)	174			249	170	133
Cotton Sole (M0)						4148

Increase in maize prices up to \$ 147/t or by 28% would induce competitiveness in about 44% of the cases in which maize had no comparative advantage. If about 50% increase occurs, over 62% of the cases would have a comparative advantage. This is a possible price level given the past trends in maize prices. Cotton, which was only noncompetitive in the Lubombo Zone, would have a DRC of unity if its world market price increases to as much as \$2562/t, or by 52%. Despite the drop in world cotton prices during the early 1990s, their levels had hardly exceeded \$1850/t in the period 1988-1993. Even with the rising price trend in later years, the break-even price would be neither attainable nor sustainable. Boosting cotton yields in this zone should, therefore, represent the only possible option.

4.4.5 Break-even Exchange Rate

A clear depreciating trend for the nominal official exchange rate in terms of the Elangeni to the dollar is depicted for Swaziland. The period-average exchange rate was E 4.3 per US \$ in 1996 as compared to E 2.2 in 1985; an increase of 96% in this period and an average annual depreciation of 6.6%. The current rate of about E 4.5/\$ is well represented in the analysis. An annual linear depreciation trend of E 0.1892 can be computed from the time-series data of exchange rates. This implies possible future real devaluation of the Elangeni, which will reflect on the comparative advantage of the grown crops.

Break-even exchange rates were calculated, at which noncompetitive activities under study will just break even (Table 4.13).

Table 4.13. Break-even Exchange Rates for Maize and Cotton Produced under Different Production Modes at which RCR=1

Activity/Item	HV	MU	ML	LE	LW	LR
Maize Mixed (M0)	5.45		9.45	5.90	8.84	5.08
Maize Mixed (M1)		7.01			6.38	5.01
Maize Sole (M0)	8.09			5.54	15.95	8.42
Maize Sole (M1)	7.37			12.67	8.17	5.93
Cotton Sole (M0)						12.34

Devaluation to E6.38 to the US Dollar, or by 43%, would bring almost half of the maize activities to the competitiveness level, while a devaluation by 34% would result in the competitiveness of about 40% of the activities. In some exceptional cases, as with mechanized and non-mechanized sole maize, high devaluation would be required to induce competitiveness. For cotton in Lubombo Range, a break-even devaluation level of E12.34 to the dollar will not be a reasonable expectation.

5. Competitiveness of Agricultural Production on Individual Tenure Farms

5.1 CROPPING STRUCTURE

As mentioned earlier, the sample of farmers was spread to cover a wide range of farm size. The variation in farm size was, therefore, quite high. This is evident from the high standard deviations in Table 5.1, which depicts the situation for maize and cotton farmers. Proceeding from the Highveld to the Lowveld zones, successive increases in farm size were reported by maize growers. The upper ranges of farm size varied from 75 to 170ha in the Highveld, from 146 to 1175ha in the Middleveld, and from 2700 to 4250ha in the Lowveld. Since sampling was selective and confined to the target crops of the study, most sampled farmers emphasized that these crops represented their major enterprises.

Table 5.1. Average Total Farm Size and Share of the Major Enterprises†

Item	HV	MV	LV
Maize Farmers:			
Average Farm Area (ha)	84 (64)	240 (303)	1659 (1825)
Average Maize Area (ha)	10	96.35	9.23
Share of Maize Area (%)	14	31	3
Cotton Farmers:			
Average Farm Area (ha)	-	-	1254 (735)
Average Cotton Area (ha)	-	-	82.5
% Cotton Area	-	-	6

† Figures in brackets are standard deviations.

However, many discrepancies exist with respect to the portion of total farm areas allocated to these crops. The share of maize area relative to the total farm size was small, especially in the Lowveld. Nevertheless, farmers in the Middleveld allocated relatively more areas to maize than those in the other two zones. Their absolute average maize areas were also much higher. This means that maize production under commercial farms in Swaziland acquires more importance in the Middleveld, being influenced by few large maize producers. Although maize was the most important activity within field crops and vegetables, there was a wide range of vegetables grown for the market in the different zones. Especially the Highveld had the highest concentration of vegetable growers, followed by the Middleveld. Vegetable production in the Lowveld was very limited. Market access seems to provide the most important drive for engagement in vegetables production. Also, varying amounts of a variety of fruits were grown. The area of fruits was reported in some cases, but most farmers provided information on the number of trees since the area was too small to be measured. Most of the small-scale fruit production was found in the Middleveld with an average area of 6.56 ha and an additional average of 163 trees per farm. An average of 6.17 ha under fruits was reported in the Highveld, but the number of growers was relatively small. The most important grown fruits were avocados, oranges, bananas, mangoes, and peach. Apples, litchis, grapefruits, and some others were grown at a smaller scale.

Given the limited share of the areas under field crops, vegetables and fruits, vast farm areas were either allocated for livestock grazing or remained unutilized. Livestock rearing was substantial and poultry production was undertaken in a considerable number of farms. Cattle was the most important livestock activity, especially in the Lowveld where the number of cattle heads raised on livestock-producing farms averaged 466. Some sampled farmers in this zone owned over a 1000 heads and, to those farmers, livestock was the major activity. Cattle averaged 120 and 33 heads per farm in the Middleveld and Highveld, respectively. Livestock enterprises elucidate the large farm size in the Lowveld and Middleveld zones, as well as the large areas devoted to livestock grazing, reaching 1850 and 113ha on livestock-raising farms in the two zones, respectively. On the other hand, 19% and 28% of the farmers in the two zones, respectively, reported rearing of sheep and goats. However, the average number was relatively small, varying around 17 heads for each type.

Cotton farmers operated farms of 1254ha average size. Cotton occupied 82.5ha on average, representing about 6% of the total farm area. The largest cotton area in the sample was 150ha with a 10% share in the total farm area. Livestock production was reported on these farms with varying degrees, yet with a lesser extent than that in the maize-producing farms. Cattle averaged 90 heads per farm. Sheep and goats were higher in number than those of the maize growers, but with a lower frequency of occurrence.

For both sugarcane and pineapple, production is highly specialized, rendering these activities highly dominant in the cropping structure. Sugar cane is grown exclusively under irrigation in Swaziland where large sugar estates dominate production under control of the Swaziland Sugar Association (SSA). Statistics depict substantial development of sugar cane areas and production in Swaziland since 1969. Cane areas increased from 13,044ha in 1969 to 37,917ha in 1994 and sugar production from 156,614 to 485,155 tons in the same period. These represent increases by 2.9 and 3.1 folds, respectively. The higher rise in sugar production was mainly attributable to a rising trend in sucrose content, which exceeded 14% in later seasons as compared to around 12.5% in the early 1980s. In recent years, the SSA has encouraged sugar cane cultivation by small-scale Swazi farmers through a quota system of the produced amount of sucrose (SSA)[35]. Although the delivered sucrose quantities continued to underlie the allocated quota, the cane areas under this mode of production increased significantly form 213 ha in 1992 to 695 ha in 1995. Nevertheless, the big estates remained as the major sugar producers in the country. Although they pursue some other economic activities such as fruit and vegetable production, operation of feed lots and breeding units cane production and milling has remained their major activity. The small growers engage more in other various activities than the estates, but cane production occupied significant portions of their farms. Its share in the farm area ranged from 16 to 61%, occurring together with the cultivation of field crops such as cotton and beans, fruits and cattle rearing.

Pineapple production is again predominantly undertaken in few large plantations, but like the situation of sugar cane, small producers are currently joining this business. On the large estates, pineapple is almost solely produced, while the small farmers combine its cultivation with various other economic activities.

The production of citrus fruits is more pronounced in the Lowveld which boasted about 79% of the 2,922 ha under citrus fruits in the country in 1992/93. The Middleveld is the other area of fruit production with a share of 21% in the same year. Grapefruit and oranges are the most dominant citrus fruits, occupying 1401 and 1303ha, respectively in 1992/93, corresponding to 48 and 45% of the total citrus area. The shares of these crops in the Lowveld were 56 and 42% of the area, respectively. While oranges are also grown to a considerable extent in the Middleveld, most of the grapefruit production is concentrated in the Lowveld.

The above description of the cropping structure reveals that, although the number of agricultural enterprises on private commercial farms is limited, considerable diversification exists on account of the many types of risks faced. Rainfall fluctuations, both in terms of quantity and distribution, designate one of the most important types of risks, but market access, uncertainty of product prices and rising trends of input prices associated with currency instability form consequential risk factors. Despite the many benefits of diversification, great advantages of specialization that are expected to feature such private farms are forfeited. Specialization is conducive to productivity increases, quality enhancement of products, efficiency in resource use and higher stability in the supply of products. These issues are of paramount importance at the national level with far-reaching consequences on the stability of performance of the agricultural sector. While weather factors are difficult to harness, other risk-inducing variables are largely manageable and need to be attended to in policy formulations so those commercial farms may shift strongly towards specialization.

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[35] Swaziland Sugar Association—Extension Services; *Report for the period May 1993 to April 1995.*

5.2 CROP YIELDS

Average yields of the crops under study in this production system, as reported by the sampled farmers in the 1995/96 season, are shown in Table 5.2.

Table 5.2. Average Yields of Different Crops (t/ha)

Crop	HV	MV	LV	Average
Maize	1.167	1.707	1.345	1.507[†]
Cotton	-	-	0.652	0.652
Sugar Cane	-	-	92.464	92.464[††]
Pineapple	-	36.687	-	36.687
Cabbage		22.225		22.225
Grapefruit			38.400	38.400
Oranges			42.140	42.140

[†] Average weighted by the number of farms in the sample.
[††] Average weighted by the size of farms in the sample.

The yield levels of all crops are generally low. Maize yields were substantially low in the three ago-ecological zones, given the considerable input use and the high-expected productivity from such commercial farms. Their national averages in the ITF farms were 2.926 t/ha in 1992/93 and 2.520 t/ha in 1993/94. In the former season, yields were 2.244, 4.084, and 2.503 t/ha in the Highveld, Middleveld, and Lowveld, respectively. The reported average yield of the three zones (1.507 t/ha) was 45% lower than the average of the two seasons. The Middleveld scored significantly higher yields than the other two zones, but its yield was still far below both the two-seasons' average yield and the potential in the zone. Cotton yields were comparable to the recent average of 0.688 t/ha realized in the past four seasons, 1992/93-1995/96 (Central Bank of Swaziland)[36]. Yet, it was still much lower than the potential of 1.2 t/ha that could be realized under farmers' conditions (Big Bend Research Station, personal communications).

Sugar cane yields were on the lower side of their trend development. The average was 104.47 t/ha of cane in 1985-1994, and was over 100 t/ha in eight out of the ten years of this period. The average pineapple yield of around 33 t/ha in 1987/88-1993/94 (excluding exceptionally low and high yielding years) was in line with the yield reported in 1995/96. The reported cabbage yields were highly variable, but the average was significantly higher than the reported national average in the country in earlier seasons. The same applied for citrus, which scored much higher yields than national averages. The discrepancies could be explained by the fact that the sample of vegetables and citrus farms was biased towards highly commercialized growers whose yields would be expected to substantially outweigh the country's average. It is to be noted that the yields used in the crop budgets for fruits were modified to accommodate the changing yield levels during the lifetime of the plantation.

5.3 PROFITABILITY AND POLICY INTERVENTIONS

5.3.1 Private Profitability

Crop budgets revealed high variable social profitability of the crops under investigation (Table 5.3).

[36] Central Bank of Swaziland - Board of Directors, 1997. Annual Report 1996/97 (CBS.001/B/97/45). Mbabane.

Table 5.3. Private Profitability of Crop Enterprises under ITF System in Various Agro-ecological Zones (E/ha)

Crop	HV	MV	LV	Average
Maize	-341	-79	-292	-228†
Cotton	-	-	101	101
Sugar Cane	-	-	4992	4992
Pineapple	-	2200	-	2200
Cabbage	-	6655	-	6655
Grapefruit	-	10176	-	10176
Oranges	-	10231	-	10231

† Weighted average (weighted by the number of farmers in the sample)

With the realized crop yields, maize production was associated with losses at the financial level in all zones, while the profitability of cotton was low. That of other crops was positive and considerable. Citrus fruits had the highest financial net returns, followed by vegetables and sugar cane. The profitability of oranges was close to that of grapefruit, while net returns to pineapple were relatively low. The financial profitability was affected by the generally high cost of production of all crops and the yield levels that were especially low for maize and cotton.

5.3.2 Social Profitability

Social profitability, as depicted in Table 5.4, was invariably higher than private profitability. It was, however, still very low or negative for maize. The other crops enjoyed high net social returns.

Table 5.4. Social Profitability of Crop Enterprises under ITF System in Various Agro-ecological Zones (E/ha)

Crop	HV	MV	LV	Average
Maize	-386	10	-217	-198†
Cotton	-	-	1485	716
Sugar Cane	-	-	9196	9196
Pineapple	-	5355	-	5355
Cabbage	-	10547	-	10547
Grapefruit	-	-	14517	14517
Oranges	-	-	14339	14339

† Average weighted by the number of farmers in the sample.

Although cotton had the lowest social profitability, its net social returns were much higher than the financial. Comparable social profitability was revealed for sugar cane, vegetables, and citrus fruits. Those of pineapple were much lower, but they were still substantial.

As in the case of cotton and groundnuts under the SNL cropping system, the higher social profitability indicates indirect taxation on most of the grown crops. Citrus, vegetables and sugar cane were more efficient earners at the national level than cotton or pineapple. However, since the analysis for pineapple was performed at the raw product level (fresh fruits), this crop has the additional advantage of its use as an intermediate product to produce processed fruits and juices, thus offers an added value to its fresh component.

5.3.3 Policy Interventions in Tradable Commodities

Policy interventions, as reflected by the NPCs (Table 5.5), were generally limited in maize, but denote taxation at varying levels for the other crops.

Table 5.5. Nominal Protection Coefficients (NPC) of Different Crops

Crop	HV	MV	LV	Average
Maize	1.22	1.03	1.03	1.10
Cotton	-	-	0.72	0.72
Sugar Cane	-	-	0.84	0.84
Pineapple	-	0.81	-	0.81
Cabbage	-	0.92	-	0.92
Grapefruit	-	-	0.91	0.91
Oranges	-	-	0.96	0.96

The highest taxation was for cotton, while that of other crops was fairly small on account of the interchange in trade in many of these crops with neighboring countries. The NPCs for sugar cane and pineapple were close (0.81 and 0.84, respectively) while those for vegetables and citrus were similar, revolving around 0.92.

The effective protection coefficients (EPCs) are shown in Table 5.6. The EPC for maize was negative in the Highveld following the negative value added at the private level, considerably low in the Middleveld where the value added was positive at both private and social levels and negative in the Lowveld where the private value added was negative. The average EPC of 0.21 reflects very high taxation, being affected by the value added at the social level (E200/ha) highly exceeding that at the private one (E42/ha) (see Appendix 7). Since the NPC did not deviate substantially from unity, the low EPC was a consequence of the relatively high taxation of the traded inputs. Similar to the situation of maize, the EPC for cotton was far below unity, portraying high taxation on the traded inputs. However, unlike maize, cotton had a positive value added at the private level (E547/ha) and a substantial one at the social level (E1294/ha).

Table 5.6. Effective Protection Coefficients (EPC) of Different Crops (EPC)

Crop	HV	MV	LV	Average
Maize	-0.86	0.42	-0.25	0.21
Cotton	-	-	0.42	0.42
Sugar Cane	-	-	0.74	0.74
Pineapple	-	0.68	-	0.68
Cabbage	-	0.83	-	0.83
Grapefruit	-	-	0.86	0.86
Oranges	-	-	0.90	0.90

For the other crops, the EPCs ranged between 0.68 and 0.90 indicating a taxing effect of policy. Taxation was highest for pineapple among these crops (0.68), followed by sugar cane (0.74). The least taxation applied to grapefruit, but it was comparable to that of oranges. The EPCs of these crops were generally slightly lower than their NPCs which means that the additional taxation on traded inputs over that of the product prices was small, except in the case of sugar cane which is slightly higher than for other crops. The least additional tax on traded inputs is depicted for grapefruit as clear from the comparable NPC and EPC.

5.4 COMPARATIVE ADVANTAGE

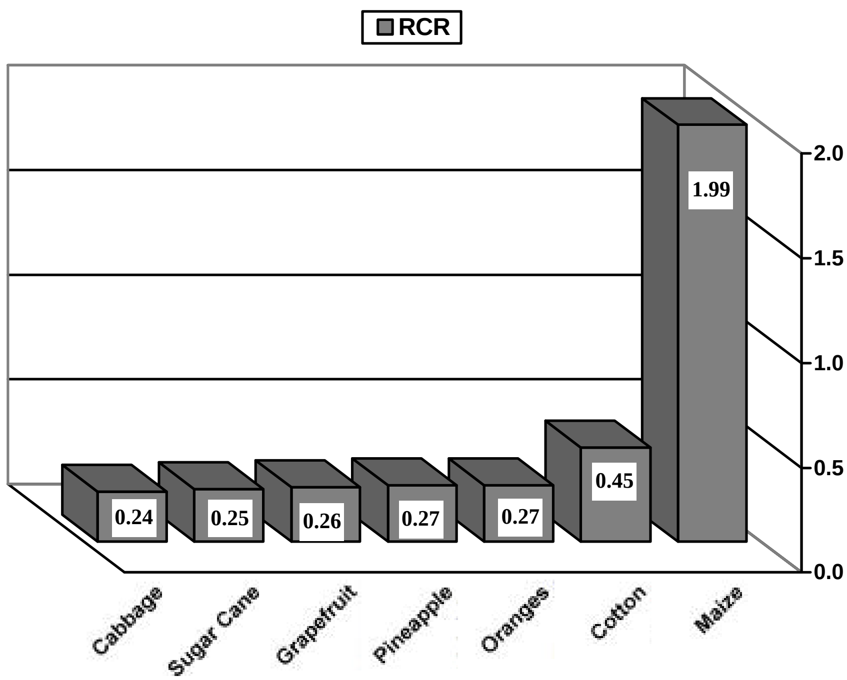
The RCRs illustrated by Figure 5.1 reflect the comparative advantage of the various crops. Obviously, maize had no comparative advantage in absolute terms, except for the marginal situation in the Middleveld. All other crops were *per se* highly efficient in utilizing domestic resources. Cabbage, with a RCR of 0.24 was the most competitive crop, followed by sugar cane having a RCR of 0.25. The RCRs of citrus fruits and pineapple were highly comparable, ranging between 0.26 and 0.27. Cotton, with a RCR of 0.45 scored a fairly good comparative advantage. It is to be mentioned that such a high comparative advantage was obtained in spite of its low financial and social profitability because of its low use of domestic resources to earn a unit of foreign exchange.

Due to the close RCRs of most the crops, the options available for their expansions depend on many other factors such as variability and risks of yields and prices, opportunities for internal and external markets, the potential to boost crop yields and the existence of competition between various types of crops. Sensitivity analysis will help to uncover some of the effects of part of these variables, while the effect of others will be highlighted in a later section.

5.5 SENSITIVITY OF THE COMPARATIVE ADVANTAGE

Similar to the analysis conducted for the SNL, the comparative advantages of the crops under the ITF production system were examined for their sensitivities to the variations in crop yields, world market prices and currency exchange rates. However, since all crops other than maize enjoyed a comparative advantage in utilizing domestic resources, the sensitivity exercise was partly directed to examine the range of these variables under which crops attain the same comparative advantage of the most competitive crop. This will be conducive to highlighting stability status of competitiveness of the various crops so that inferences could be drawn on potentials for expansion. The adopted scenarios are presented in the following.

Figure 5.1. RCRs of Different Crops on ITF



5.5.1 Comparative Advantage with Average Crop Yields

The comparative advantage of the various crops was examined under average yields realized in the country. Available statistics allow the computation of long-term average yields of the crops under consideration, except for maize and vegetables on which time-series data was not available for this sector. Also for all crops, yield records were not disaggregated by agro-ecological zone. Sugar cane, pineapple and, to a large extent, cotton and citrus fruits, are concentrated in certain agro-ecological zones on which sampling was focused. Average yields by agro-ecological zone were available for season 1992/93 and were accordingly used in the sensitivity analysis for maize, cotton, and cabbage. For other crops, the average yields in the period 1987/88-1993/94 were used. The delineated yields are shown in Table 5.7.

Table 5.7. Average Crop Yields in ITF in the Period 1987/88-1993/94 (Maize, Cotton, and

Cabbage in Season 1992/93)

Crop	HV	MV	LV	Swaziland
Maize	2.244	4.084	2.503	2.926
Cotton	-	-	0.658	0.734
Sugar Cane	-	-	104.74	104.74†
Pineapple	-	34.66	-	34.66
Cabbage	13.84	21.67	5.88	16.97
Grapefruit	-	-	42.16	42.16
Oranges	-	-	20.08	20.08

† Yield of large estates, not including small-scale growers.

Discrepancies between the sample and national yields were largely explained earlier. The sample yields of maize, sugar cane and grapefruit were lower at varying degrees than the national averages, those of cotton and pineapple were comparable to the national levels, while yields of cabbage and oranges were significantly higher. With national yields, the comparative advantage was examined, as elucidated by the RCRs of Table 5.8.

Table 5.8. Resource Cost Ratios (RCRs) with National Average Yields under the ITF System

Crop	HV	MV	LV	Swaziland
Maize	0.71	0.25	0.50	0.41
Cotton	-	-	0.44	0.38
Sugar Cane	-	-	0.22	0.22
Pineapple	-	0.29	-	0.29
Cabbage	-	0.24	-	0.33
Grapefruit	-	-	0.24	0.24
Oranges	-	-	0.52	0.52

The comparative advantage of maize has enormously improved to reach 0.41, following the high yield discrepancies between reported and national yields of 1992/93. Its rank advanced ahead of oranges, but still remained far behind other crops. Cotton enjoyed a close RCR of 0.44 to the previous one in the Lowveld due to the negligible yield difference in the two situations, while its competitiveness at the national yield level improved, scoring a RCR of 0.38. Both sugar cane and grapefruit scored more favorable RCRs, though the difference was small. The situation of pineapple has worsened, but again by a small amount. The highest discrepancy was reported for oranges following the high yield difference. Most crops, however, largely maintained their competitiveness levels, implying that they were substantially insensitive to the contemplated yield variation. Sugar cane, pineapple, and grapefruit largely maintained their ranks among the grown crops in the use efficiency of domestic resources.

From these comparisons, it was evident that the competitiveness of sugar cane, pineapple, grapefruit, and cotton had low vulnerability at the national yield levels. The competitive threshold yields of the former three crops represented long-term averages, which reflect reliable yield expectations. For cotton, although the national average was for the 1992/93 season, the long-term average for Swaziland in the period 1987/88-1993/94 of 0.758 t/ha had only a small deviation from the figure used in the sensitivity analysis. This provides high stability with respect to the competitiveness of these crops in relation to their yield levels.

The foregoing analysis shows that, apart from maize, the yields used in the analysis were well within the reasonable range of national figures. Subject to these yields, most of the commercial crops boasted favorable positions with respect to their utilization of domestic resources. It is worth consideration that cotton, despite its low yields, enjoyed a fair comparative advantage. It also has a promising potential for its yields to be improved on account of their considerable difference to research yields as well as to those realized by some farmers under good management. The overall national average of 0.734 t/ha was associated with a favorable RCR of 0.38. As with the case in the SNL, cotton's competitiveness was considerably sensitive to its yield level, thus providing a sustainable comparative advantage of this crop with a moderate yield improvement. Maize yields have to be significantly boosted before the crop competes favorably with other commercial crops. Its RCRs as presented in Table 5.6 were realized by about a doubling of the yields reported by the sampled farmers, yet ran short of competing with most of the other commercial crops. The potential, however, exist to boost maize yields beyond this level. Research yields obtained in on-farm trials were well above 3.5 t/ha, offering an encouraging potential for yield enhancement.

5.5.2 Competitive Threshold Yields

Unlike the situation of the SNL, most of the crops enjoyed a comparative advantage status, as reflected by their RCRs of less than one. The most favorable RCR of 0.24 was reported for cabbage, but this level may not be sustainable under expected yield variation. Accordingly, sugar cane, which depicted a very close figure (0.25), would provide an appropriate yardstick against which competitive yield levels of other crops could be examined. Accordingly, threshold yields of other crops were derived under which the RCR was 0.25. Comparisons of these threshold yields with the realized ones provide insight as to the needed and likely achievable levels of yield improvement.

Table 5.9 shows the competitive threshold yields of the crops under consideration as well as their relationship to both their reported and national yields. The deviations of the calculated threshold yields form either the reported or national levels were variable among the six crops. For instance, the threshold yield of sugar cane was 88% of its national average. A 12% yield gap needs to be bridged which is quite possible to achieve, given the long-term sugar cane yields. At the national level, the yield threshold was little above the realized one, illustrating the high sustainable competition of this crop. The threshold yields of grapefruit and pineapple had reasonably low deviations from the reported and the national levels that ranged between 5 and 12%. Again, these competitive yield levels seem highly achievable. For cabbage, the competitive yield hardly deviated from the reported or the national levels in the Middleveld, but the gap of 28% was moderately high at the national level and requires substantial efforts to bridge. The discrepancy of oranges' competitive yield to the reported one was low in the Lowveld, which is a major area of citrus production. However, the gap to the national average was high, amounting to 30%, which again requires a significantly yield boost. Deviations of cotton were the highest among the crops other than maize. A gap of 37% needs to be bridged at the national level which, although looks substantial, it is yet possible to achieve in light of the results of on-farm trials discussed earlier.

Table 5.9. Competitive Threshold Yields (t/ha) and Their Relations (%) to Reported and National Yields under the ITF System (t/ha)

Crop	Item	HV	MV	LV	Average
Sugar Cane	Break-even Yield			92.464	93.599
	% of Reported Yield			100	89
	% of National Yield			88	101
Cabbage	Break-even Yield		21.238		21.274
	% of Reported Yield		96		96
	% of National Yield		98		128
Grapefruit	Break-even Yield		40.3		40.3
	% of Reported Yield		105		105
	% of National Yield		105		105
Pineapple	Break-even Yield		38.739		38.739
	% of Reported Yield		106		106
	% of National Yield		112		112
	Break-even Yield			1.002	1.002
Cotton	% of Reported Yield			154	152
	% of National Yield			152	137
Oranges	Break-even Yield			46.1	
	% of Reported Yield			109	
	% of National Yield			230	
Maize	Break-even Yield	4.677	4.097	4.190	3.685
	% of Reported Yield	401	240	312	262
	% of National Yield	208	100	167	126

Maize had the highest deviations between efficient and achieved yields. The gaps were very high to the reported yield and significantly lower for the national level. They were least in the Middleveld and highest in the Highveld. At the overall national level, a yield improvement of 26% would be required. The Middleveld revealed the highest potential for competitive maize production.

The domain of competitive threshold yields illustrates the highly stable comparative advantage of sugar cane and grapefruit. Vegetables were more vulnerable to yield variability, while orange production assumed stability in the Lowveld. A greater challenge is faced for maize and, to some extent, cotton production to boost their yields to levels approaching on-farm research yields.

It is to be mentioned that the effect of technology on crop competitiveness will be similar to the situation analyzed for SNL with respect to maize and cotton. However, it would be expected that due to economies of scale on the relatively large farms in this sub-sector, production costs would be lower leading to higher value added and more favorable RCRs. Technology options are not available for the other commercial crops in the ITF, but it would be expected that farmers largely adopt the improved technology levels at their disposal. Yet, research data are needed for a reliable evaluation of the effect of technology.

5.5.3 Effect of World Market Prices

Due to expected changes in world market prices, sensitivity analysis was first conducted to explore border prices of the various crops that will maintain RCR values equal to 0.25 which was the threshold level realized for sugar cane. Then a flat arbitrary 25% decrease in crop prices was introduced to examine their competitiveness, other things being equal. The threshold prices of the crops in their respective zones are presented in Table 5.10, together with their percentage relations to the prices actually used in the analysis. Further, the Table shows the RCRs under a 25%

reduction in world market prices of these crops.

Table 5.10. Competitive Threshold World Market Prices ($/ha), Their Relations (%) to Current Prices, and RCRs with 25% Less World Market Prices

Crop	Item	HV	MV	LV
Sugar Cane	Break-even Price			369
	% of Used Price			100
	RCR with 25% Less Price			0.45
Cabbage:	Break-even Price		222.7	
	% of Used Price		96	
	RCR with 25% Less Price		0.36	
Grapefruit:	Break-even Price		254	
	% of Used Price		103	
	RCR with 25% Less Price		0.38	
Pineapple:	Break-even Price		329	
	% of Used Price		102	
	RCR with 25% Less Price		1.03	
Cotton:	Break-even Price			2597
	% of Used Price			154
	RCR with 25% Less Price			0.70
Oranges:	Break-even Price			245
	% of Used Price			104
	RCR with 25% Less Price			0.4
Maize:	Break-even Price	386	241	305
	% of Used Price	336	210	265
	RCR with 25% Less Price	-	-	-

Generally, the sensitivities of the RCR to world market prices were less than they were to crop yields at the competitive threshold levels. The highest sensitivity was computed for cotton that required 10% higher prices to be as competitive as sugar cane. Cabbage prices may decrease by 4% and the crop in the Middleveld would be as competitive as sugar cane. Obviously, if the country's average situation were considered, large increases in world market prices would be required for a competitive status of both cabbage and oranges.

As in the case of crop yields, maize prices should rise by more than two to three times for the crop to earn a RCR comparable to that of sugar cane. On the other hand, a flat 25% decrease in world market prices of these crops would have a drastic effect on pineapples, rendering it hardly competitive. The impact on cotton was also considerable, implying a sharp needed surge of 54% in its world prices for a similar competitiveness to sugar cane and deterioration in its RCR to 0.70 if its price decreases by 25%. It, however, remains competitive in the latter case. The effect on other crops was moderate, but it was higher on sugar cane (RCR=0.45) than on other crops. The least effect was on cabbage, but again its yield variability should be borne in mind before conclusions on its rank are drawn.

5.5.4 Effect of Exchange Rate

The effect of the exchange rate was monitored by a re-computation of the RCRs at a 25% devaluation of the Elangeni to the US dollar. This was again an arbitrary reduction that was assumed to go in harmony with the real exchange rate. The results are shown in Table 5.11.

Table 5.11. RCRs under ITF System with a 25% Currency Devaluation

Crop	HV	MV	LV
Sugar Cane			0.18
Cabbage		0.21	
Grapefruit			0.22
Pineapple		0.19	
Cotton			0.36
Oranges			0.22
Maize	-0.57	1.45	9.88

Clearly, devaluation would result in apparent improvements in the comparative advantage of all crops. Sugar cane and, to a slightly lower extent, pineapple will benefit most of the devaluation, but the other crops, except for maize, will all have advantageous RCRs. Cotton will, however, undergo a relatively lower competitiveness. Priorities for expansion will be for sugar cane, followed by pineapple, vegetables, and citrus fruits.

5.5.5 Effect of Land Opportunity Cost

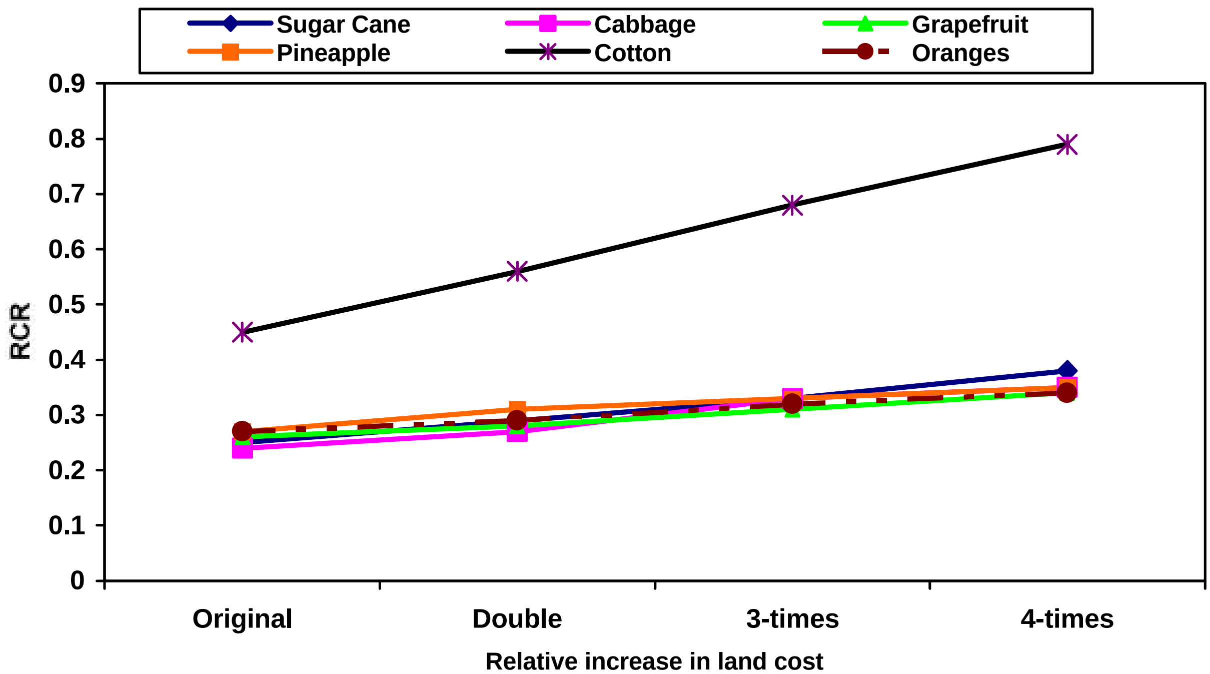
The survey results showed that land renting was not a common practice under this system. Only five maize farmers reported renting part of their holdings, while those producing other crops had hardly rented land. The absence of a land rent market makes it difficult to determine an economic land rent. This is exacerbated by the complex opportunities for alternative land use and the variation in the land opportunity cost with the type of crop and system of production. For instance, opportunities for sugar and fruit producers for a shift in cropping in the short run are limited by the high fixed costs and their association with existing processing plants as evident for sugar cane production. In rainfed areas, alternative crops are limited to those types, which can thrive under rainfed conditions and are further constrained by the characteristics of the agro-ecological zones. Cotton, for example, is not suitable to produce in the Highveld and pineapple adaptation is largely confined to the Middleveld. There is a wide range of other crops such as legumes and cucurbits, but their areas are too small to accommodate a shift of any of the crops under investigation. In irrigated areas, opportunities for vegetables are largely among their different types due to their small areas, while opportunities available to shift from other irrigated crops to vegetables will in turn be constrained by the market for such large vegetable production.

The opportunity cost of land of E150/ha for rainfed crops was an estimate based on the information provided by farmers in this sector, which was quite variable. Based on this, the opportunity land cost of irrigated crops was set at E500/ha, taking the differences in land value between the two systems into consideration. Since both estimates were bound with inaccuracy, land rent was varied to examine its differential effect on the comparative advantage of crops. The variation was made by increasing the land rent by two, three and four times its original values. Table 5.12 and Figure 5.2 show the RCRs with different land rents and their percent change over the whole range. Maize was excluded in this analysis since obviously, a rising land rent will largely worsen its already noncompetitive situation.

Table 5.12. RCRs with Variation of the Opportunity Cost of Land and Their Percentage Change

Crop	Change in Land Opportunity Cost				% Change of RCR
	Original	Double	3-times	4-times	
Sugar Cane	0.25	0.29	0.33	0.38	52
Cabbage	0.24	0.27	0.33	0.35	46
Grapefruit	0.26	0.28	0.31	0.34	31
Pineapple	0.27	0.31	0.33	0.35	30
Cotton	0.45	0.56	0.68	0.79	77
Oranges	0.27	0.29	0.32	0.34	26

Figure 5.2. Change in RCRs with Increased Land Opportunity Cost on ITF



A drastic effect of increased economic land rent will fall on cotton, reducing its RCR by 77%. The effect of both sugar cane and vegetables was substantial while that on citrus fruits and pineapple was comparable and small. This means with increasing competition for land, cotton and sugar cane will lose their relative competitiveness and further increases will affect fruits and pineapple.

5.6 CROP COMPETITION FOR DOMESTIC RESOURCES

Underpinnings to the selection of crops that enjoy a potential for expansion in the ITF sector are, on the one hand, the available domestic resources of land, irrigation water, labor and domestic capital and, on the other hand, the natural endowments and demographic characteristics of the agro-ecological zones of the country. From the domestic resources side, labor can be considered to have substantial availability relative to the current economic activities as reflected by the prevailing high rate of unemployment and the relatively low wages of unskilled labor. Domestic capital, although in scarce availability, is highly supplemented by foreign capital through foreign investments that the government strives to secure. Arable land and irrigation water remain as the most important limiting factors for which agricultural activities compete. Efficient use of these resources would form an important yardstick for the selection of the agricultural activities for expansion.

With the natural endowments in the various agro-ecological zones, the Lowveld has acquired limited importance in the activities of the ITF sector. Barring sugar cane production, its economic undertakings there are largely in the areas of ranching and animal husbandry. The Highveld and Middleveld are favored by better rainfall potential than the Lowveld, which nevertheless, enjoys better irrigation potential. Both the Middleveld and Highveld have more population densities and thus offer greater domestic consumption patterns, especially for vegetable crops. The former, however, has the highest population density in the country.

Bearing the cropping patterns in the different zones in mind, competition in the Highveld would mainly be between maize and vegetables. Unless maize yields receive a massive boost, vegetable production would enjoy a comparative advantage in the use of domestic resources there. Despite the high rainfall, this means that further irrigation possibilities needs to be exploited. In the Middleveld, both irrigated and rainfed crops compete for land and irrigation water. Maize would compete with pineapple more in rainfed areas, while vegetables and, to some extent, citrus (oranges) would compete under irrigation conditions. Priorities would be for pineapple and vegetables. The competitiveness of maize will again depend on improvements in its yields, but the potential for this seems to be higher than in the Highveld. Oranges would come into consideration, but the long-term binding effect of orchards needs to be taken into account, which may entail higher risks of market availability and price variation than annual crops such as vegetables and maize or short-term crops as in the case of pineapple. In essence, pineapples would be expanded in rainfed areas of this zone and vegetables under irrigation. However, due to the higher competitiveness of vegetables, their expansion may be at the expense of pineapple if competition for irrigable land comes into consideration.

In the Lowveld, competition would be among sugar cane, fruits and, possibly, irrigated cotton although the latter was not considered in the analysis. With limited chances for irrigation, sugar cane would gain priority, followed by fruits. Cotton cultivation would be expanded under rainfed conditions. Nevertheless, an evaluation of the competitiveness of irrigated cotton may need to be made.

6. Summary and Conclusions

The SNL sector addressed in this study is essentially a smallholder subsistence domain where maize is mainly grown for domestic consumption with high reliance on family labor. This implies the importance of domestic maize production as a food-security crop for the rural families. The analysis has shown that private profitability in maize production was questionable, but was more attainable with mechanized mixed maize production. Since private profitability was computed net of all production costs including imputed costs of family labor, negative net returns would mostly be reflected as low returns to family labor. On the other hand, both cotton and groundnuts had positive private profitability. Social profitability was negative for maize except in the lower parts of the Middleveld zone. Again, positive and substantial social profitability was reported for cotton and groundnuts.

Policy interventions were variable. While there was limited intervention in maize prices as indicated by an NPC close to one, the NPC figures implied taxation of cotton and subsidy to groundnut prices. The EPC figures indicated the tendency for taxation of mechanized maize and cotton with respect to tradable commodities; and subsidy for groundnut. Intervention was low in non-mechanized maize.

Maize had low comparative advantage except in the low areas of the Middleveld and fair comparative advantage under mixed mechanized cropping. Both cotton (except in Lubombo Range) and groundnuts had a comparative advantage in their production systems and therefore represent good candidates for expansion. The low comparative advantage of maize was mainly attributable to its low yields. Generally, maize yields were higher with mechanized tillage, resulting in a comparative advantage with this technology. However, taxation of mechanized maize represented a discouraging policy intervention for competitive maize production. Provision of mechanized tillage at reasonable costs and terms will be conducive to improvement of the comparative advantage of local maize production.

The calculated break-even yields (those that result in unity RCR) show that attainable yield improvements can be made. Target yields ranging between 0.8 and 1.7 t/ha in most of the cases are possible to realize. Given the importance of maize production in this sector with its high strive for food security, improvement in the maize comparative advantage rather than resort to import would be appealing. Investment in research, extension, and technology transfer components will be conducive for maize productivity improvement. Cotton proved to be competitive in the use of domestic resources under mechanized production mode and its production should be encouraged under this mode. Groundnut yields need to be boosted since, if international price decreases and/or production costs increase, the crop's comparative advantage may be impaired, given the relatively high RCR.

Increases in the world market prices of maize would induce similar positive effects on the comparative advantage to those of maize yields. A price increase of 28% would induce maize competitiveness in about 40% of those production modes that had no comparative advantage. However, since Swaziland cannot influence the world market price of maize, the option is to monitor and predict the trend in world market prices in order to delineate production decisions under these modes.

The exchange rate policy would be possible to manipulate. Currency devaluation by 34% would bring about 40% of the non-competitive maize to a state of comparative advantage. There are however two important aspects to take into consideration. First, the devaluation should match the nominal and real exchange rates, otherwise the comparative advantage will be unrealistic. Second, the effect of devaluation on the performance of other crops as well as on large sectors in the economy needs to be carefully monitored.

A distinct feature of the ITF system is the limited crop enterprises in relation to the large farm size. Vast areas of land seem to be unutilized, although some are left for livestock grazing. Another feature is the considerable crop diversification, induced by risks of rainfall shortage, market access, and products and inputs price fluctuations associated with exchange-rate variability. This has the consequence that many advantages of specialization that are expected to feature private firms and contribute to stability of the performance of the agricultural sector are forfeited. Policy interventions may address those manageable factors that reduce risk and encourage more specialization to enhance efficiency in the use of domestic resources.

Reported crop yields were generally on the low side, but those of maize were particularly poor. High yields are otherwise expected in such high-input commercial farms while potential exists for higher sustainable yields in this sector. National average yields were, however, more comparable to the reported yields in the cases of cotton, pineapple, sugar cane and grapefruits. Wider deviations and variability existed for maize, vegetables, and oranges. Maize, which is widely grown across agro-ecological zones, revealed higher yields in the Middleveld than in the other zones.

Different levels of discrepancy existed for the grown crops between their private and social profitability. At the private level, losses were incurred for maize, while cotton revealed low profitability. Positive and considerable returns were computed for the other crops, with citrus crops scoring the highest financial net returns, followed by vegetables and sugar cane. Net returns to pineapple were relatively low. The financial profitability was highly affected by the yield levels. Social profitability was invariably higher than the private profitability, although it was still very low or negative for maize. Although cotton had the lowest social profitability among crops other than maize, its net social returns were much higher than its financial returns. Comparable social profitability was revealed for sugar cane, vegetables and citrus. Those of pineapple were much lower, but were still substantial.

Policy interventions in crop prices denoted varying taxation, the highest being for cotton while that for maize was negligible or slightly subsidized. The limited intervention in other crops was probably influenced by the high trade interchange with many of the countries in the region. For both product prices and tradable inputs, the combined policy intervention as depicted by comparing the nominal and effective protection coefficients, was manifested by high taxation on maize, being more pronounced on the tradable-inputs part. Cotton was also highly taxed, but its value added was positive at the private level and substantial at the social level. For the other crops, the taxing effects of policy were lower, being highest for pineapple, followed by sugar cane. The least taxation applied to grapefruit, which was comparable to that of oranges. Except for cotton and maize, taxation on the traded inputs over that of the product prices was small, although it was slightly higher for sugar cane. The least tax on traded inputs is depicted for grapefruit.

Illustrated by their resource cost ratios, all crops except maize enjoyed comparative advantages of using domestic resources. Maize was, however, marginally competitive in the Middleveld. Cabbage had the highest comparative advantage at the reported yields in the Middleveld, but the attainment of such yield was bound with variability at the national level. Sugar cane, therefore, was found to enjoy the highest and more stable comparative advantage. Other crops had more or less comparable competitiveness, being slightly better for pineapple and citrus fruits. In spite of its low financial and social profitability, cotton scored fair comparative advantage.

Analyses were conducted to examine the sensitivity of the comparative advantage to targeted changes in crop yields, world market prices and currency exchange rates. With national average yields, maize enjoyed a comparative advantage, but its competitiveness was still far behind most crops. The position of cotton did not change in the Lowveld, but its comparative advantage improved considerably at the national level. Pineapple had a slightly lower comparative advantage, while that for oranges was substantially lower than with its reported yield in the Lowveld. The competitiveness of cotton, sugar cane, pineapple and grapefruit had low vulnerability to expected yield variations, while maize yields have to be significantly boosted before the crop competes favorably with other commercial crops.

Competitive yields, calculated as the yields under which each crop will have the same comparative advantage as that of sugar cane, illustrate high stabile comparative advantage of sugar cane, cotton and grapefruit. Vegetables were more prone to yield changes, while the production of oranges seemed to be stable under the Lowveld conditions. A greater challenge is faced for maize production with respect to boosting of its yields to levels approaching on-farm research yields.

Competitive world market prices of crops, calculated in the same way of the competitive yields, revealed that the sensitivities of the comparative advantage to world market prices were less than those to threshold crop yields. Cotton would require a massive boost in its world market prices for a similar competitive position to that of other crops, while a minor price adjustment was required for vegetables to match the sugar cane's comparative advantage. Under national average yields, world market prices of both cabbage and oranges would have to increase for a competitive status. Also, maize prices should rise by more than two to three times for the crop to be as competitive as sugar cane. On the other hand, a 25% decrease in the world market prices of crops would have a drastic effect on pineapples, rendering it hardly competitive. The effect on other crops was moderate, but it was higher on cotton and sugar cane than on other crops. The least effect was on cabbage, but again its yield variability should be borne in mind before conclusions on its rank are drawn.

The effect of an arbitrary 25% devaluation of the Elangeni to the US dollar was portrayed as a distinct improvement in the comparative advantage of all crops. Sugar cane and, to a slightly lower extent, pineapple will benefit most from the devaluation. Other crops, except for maize, will all have high comparative advantage, but cotton competitiveness still kept its relatively low rank. Priorities for expansion would be for sugar cane, followed by pineapple, vegetables, and citrus fruits.

The comparative advantage and sensitivity analysis showed high and fairly stable competitiveness of sugar cane, pineapple, grapefruit and cotton. Those of vegetables and oranges were bound with some variation with crop yields. Since, in general, all crops except for maize acquired a comparative advantage, options for their expansion will depend on their competition for domestic resources which vary with the natural and socioeconomic characteristics of the agro-ecological zones. In the Highveld, vegetable production enjoys expansion prospects, unless maize yields are massively improved. Despite the high rainfall, this means that further irrigation possibilities needs to be exploited to expand vegetables production. In the Middleveld, priorities would be for pineapple in rainfed areas and vegetables under irrigated conditions, with higher advantage for the latter under competition for irrigated land. Expansion possibilities of maize will again depend on improvements in its yields there where the potential is higher than in the other two zones. Expansion of oranges may have prospects, but the longer time horizon of orchards and their binding effects, which may be associated with higher risks of market availability and price variation than annual crops, should be taken into consideration. In the Lowveld sugar cane would gain priority under irrigated conditions, followed by citrus fruits (mainly grapefruit), while the competitiveness of irrigated cotton may need to be evaluated. Rainfed cotton would, however, be expanded under rainfed conditions.

APPENDICES

Appendix 1. Private and Social Crop Prices Used in the Crop Budget Estimates (E/t)

Sector/Crop	Private Price	Social Price
Swazi Nation Land:		
Maize	629	608
Cotton	2773	3615
Groundnut	2850	2346
Individual Tenure Farms:		
Maize†	741-630	608
Cotton	2170	3615
Pinapple	237	291
Sugar Cane	139	166
Grapefruit	720	795
Oranges	727	757
Cabbage	780	852

† Private maize prices were E741/t in the Highveld and E630/t in each of the Middleveld and Lowveld.

Appendix 2. Technical Coefficients of Inputs Used in the Crop Budgets in Swazi Nation Land

2.1 Maize

2.1.1 Mixed Maize, no machinery use

Item	HV	MU	ML	LE	LW	LR
Machinery (hrs/ha)	0	-	0	0	0	0.30
Oxen (hrs/ha)	1.69	-	9.72	8.48	18.92	19.67
Skilled Labor (hrs/ha)	0	-	0	0	0	0.30
Unskilled Labor (hrs/ha)	321	-	105	276	152	351
Materials:						
Seeds (kg/ha)	7.7	-	7.7	7.7	7.7	7.7
Fertilizers (kg/ha)	0	-	0	116	0	76
Herbicides (l/ha)	0	-	0	0	0	0
Insecticides (l/ha)	0	-	0	0	0	0
Packing Material (no.)	14.14	-	5.51	15.43	8.06	21.57

2.1.2 Mixed Maize, machinery use

Item	HV	MU	ML	LE	LW	LR
Machinery (hrs/ha)	2.38	4.92	2.36	-	5.03	5.76
Oxen (hrs/ha)	2.35	4.31	3.86	-	6.12	9.91
Skilled Labor (hrs/ha)	2.38	4.92	2.36	-	9.21	5.13
Unskilled Labor (hrs/ha)	315	271	152	-	142	397
Materials:						
Seeds (kg/ha)	7.7	7.7	7.7	-	7.7	7.7
Fertilizers (kg/ha)	0	0	0	-	75	378
Herbicides (l/ha)	0	0	0	-	0	0
Insecticides (l/ha)	0	0	0	-	0	0
Packing Material (no.)	35.99	12.31	19.06	-	16.00	34.61

2.1.3 Sole Maize, no machinery use

Item	HV	MU	ML	LE	LW	LR
Machinery (hrs/ha)	0	-	0	0	0	0
Oxen (hrs/ha)	0.47	-	12.94	10.01	10.85	6.64
Skilled Labor (hrs/ha)	0	-	0	0	0	0
Unskilled Labor (hrs/ha)	209	-	163	378	232	272
Materials:						
Seeds (kg/ha)	7.7	-	7.7	7.7	7.7	7.7
Fertilizers (kg/ha)	0	-	0	80	11	159
Herbicides (l/ha)	0	-	0	0	0	0
Insecticides (l/ha)	0	-	0	0	0	0
Packing Material (no.)	8.34	-	64.26	20.37	5.37	13.43

2.1.4 Sole Maize, machinery use

Item	HV	MU	ML	LE	LW	LR
Machinery (hrs/ha)	3.29	-	4.31	4.09	0.40	5.14
Oxen (hrs/ha)	11.60	-	6.58	0.62	2.40	5.05
Skilled Labor (hrs/ha)	3.86	-	4.31	4.39	3.8	5.14
Unskilled Labor (hrs/ha)	256	-	168	86	130	206
Materials:						
Seeds (kg/ha)	7.7	-	7.7	7.7	7.7	7.7
Fertilizers (kg/ha)	0	-	0	20	121	200
Herbicides (l/ha)	0	-	0	0	0	0
Insecticides (l/ha)	0	-	0	0	0	1.40
Packing Material (no.)	14.19	-	23.5	6.8	12.57	24.96

2.1.5 Cotton and Groundnut, sole cropping, with and without machinery use

Item	HV	MU	ML Groundnut	LE Cotton	LW Cotton	LR Cotton
Machinery (hrs/ha)	-	-	0	4.37	4.00	0
Oxen (hrs/ha)	-	-	42.9	4.15	0	2.18
Skilled Labor (hrs/ha)	-	-	0	4.37	4.00	3.00
Unskilled Labor (hrs/ha)	-	-	671	217	441	345
Materials:						
Seeds (kg/ha)	-	-	40	45	45	45
Fertilizers (kg/ha)	-	-	0	0	0	136
Herbicides (l/ha)	-	-	0	0	0	0
Insecticides (l/ha)	-	-	0	0.57	1.33	4.9
Packing Material (no.)	-	-	29.7	2.98	4.54	2.17

Appendix 3. Private and Social Prices of Inputs and Services in Swazi Nation Land

Item	Private	Social
Machinery (E/hr)	44	28.1
Oxen (E/hr)	10	10
Skilled Labor (E/hr)	2	2
Unskilled Labor (E/hr)	1	1
Materials:		
Seeds (E/kg):		
Maize	5.27	5.27
Cotton	1.73	1.73
Groundnut	5.00	5.00
Fertilizers (E/kg)	1.00	0.84
Herbicides (E/l)	120	106
Insecticides (E/l)	115	106
Packing Material (E/unit):		
Maize/Groundnuts	3.5	2.65
Cotton	14	7.94

Appendix 4. Technical Coefficients of Inputs Used in the Crop Budgets in ITF

4.1 Maize

Item	HV	MV	LV
Machinery (hrs/ha)	7.45	8.02	7.97
Skilled Labor (hrs/ha)	29.1	14.69	16.28
Unskilled Labor (hrs/ha)	133	97	91
Materials:			
Seeds (kg/ha)	19.0	18.71	17.19
Fertilizers (kg/ha)	219	215	263
Herbicides (l/ha)	1.66	1.28	0.67
Insecticides (l/ha)	1.99	0.36	0.37
Packing Material (no.)	16.67	24.38	19.21

4.2 Other Crops

Item	Cotton	Pineapple†	Sugar Cane†	Grape-fruit	Oranges	Cabbage

Machinery (hrs/ha)	8.91	10.03	25.18	4.33	4.33	5.22
Field Staff (hrs/ha)	-	41.6	240	-	-	-
Skilled Labor (hrs/ha)	17.06	111	140	5.00	5.00	5.22
Unskilled Labor (hrs/ha)	347	591	433	164	166	820
Materials (total):						
Seeds (kg/ha)	25.5	-	-	280✞	280	24200✞
Fertilizers (kg/ha)	82	-	-	681	681	1092
Herbicides (l/ha)	1.50	-	-	0	0	-
Insecticides (l/ha)	3.33	-	-	44.56	0	6.98
Packing Material (no.)	3.26	-	192.95	2573✜	2554✜	1235✧

† Costs of materials for pineapple and sugar cane were E3372 and E2412/ha, respectively.
✞ Transplants. ✜ Cartons. ✧ Plastic bags.

Appendix 5. Private and Social Prices of Inputs and Services in the ITF

5.1 Maize

Item	Private	Social
Machinery (E/hr)	55	28.1
Skilled Labor (E/hr)	1.25	1.25
Unskilled Labor (E/hr)	0.75	0.75
Seeds (E/kg)	6.37	6.37
Fertilizers (E/kg)	1.13	0.95
Herbicides (E/l)	30.76	26.45
Insecticides (E/l)	37.83	31.74
Packing Material (E/unit)	4.01	3.17

5.2 Cotton

Item	Private	Social
Machinery (E/hr)	55	28.1
Skilled Labor (E/hr)	1.25	1.25
Unskilled Labor (E/hr)	0.75	0.75
Seeds (E/kg)	1.5	1.5
Fertilizers (E/kg)	1.28	1.06
Herbicides (E/l)	121	106
Insecticides (E/l)	68.5	52.9
Packing Material (E/unit)	15.0	7.94
Services (transport) (E/ha)	16.30	16.30

5.3 Pineapple

Item	Private	Social

Machinery (E/hr)	46.5	28.1
Skilled Labor (E/hr)	1.88	1.88
Unskilled Labor (E/hr)	1.26	1.26
Field Staff (E/hr)	2.5	2.5
Materials (E/ha)	3372	2962
Administration	96	96

5.4 Sugar Cane

Item	Private	Social
Machinery (E/hr)	45.5	28.1
Skilled Labor (E/hr)	2.8	2.8
Unskilled Labor (E/hr)	2.22	2.22
Materials (E/ha)	2412	2052
Services (E/ha)	883	774
Administration (E/ha)	506	506
Packing Material (E/one)	7.00	6.14

5.5 Citrus

Item	Private	Social
Machinery (E/hr)	65	28.1
Skilled Labor (E/hr)	1.89	1.89
Unskilled Labor (E/hr)	1.5	1.5
Materials:		
Transplants (E/one)	18	18
Fertilizers (E/kg)	1.02	0.89
Insecticides (E/l)	41.39	36.31
Packing Material (E/one)	1.5	1.32
Services (E/ha)	258	258
Irrigation (E/ha)	2620	2298

5.6 Vegetables (cabbage)

Item	Private	Social
Machinery (E/hr)	55	28.1
Skilled Labor (E/hr)	1.89	1.89
Unskilled Labor (E/hr)	0.94	0.94
Materials:		
Transplants (E/one)	0.05	0.05
Fertilizers (E/kg)	1.08	0.85
Insecticides (E/l)	120	105
Packing Material (E/one)	0.9	0.79
Services (transport) (E/ha)	667	585
Irrigation (E/ha)	2620	2298

Appendix 6. Results of Domestic Resource Cost Analysis for Crops Grown in Different Zones on Swasi Nation Land Under Different Production Modes, 1995/96

6.1 Highveld

a) Maize Mixed (M0)
PAM

Level	Revenue	Costs		Profits
		Tradables	Domestic	
Private	622	100	379	144
Social	602	157	536	-91
Transfers	20	-56	-158	234

Policy Indicators:
PP=144; SP=-91; NPC=1.03; EPC=1.17; NPE=234; VAD=446; RCR=1.20.

b) Maize Mixed (M1)
PAM

Level	Revenue	Costs		Profits
		Tradables	Domestic	
Private	1583	293	428	862
Social	1532	231	623	678
Transfers	51	62	-195	184

Policy Indicators:
PP=862; SP=678; NPC=1.03; EPC=0.99; NPE=184; VAD=1301; RCR=0.48.

c) Maize Sole (M0)
PAM

Level	Revenue	Costs		Profits
		Tradables	Domestic	
Private	367	74	240	53
Social	355	68	540	-253
Transfers	12	6	-300	306

Policy Indicators:
PP=53; SP=-253; NPC=1.03; EPC=1.02; NPE=306; VAD=;288; RCR=1.88.

d) Maize Sole (M1)
PAM

Level	Revenue	Costs		Profits
		Tradables	Domestic	
Private	624	263	450	-89
Social	604	173	742	-311
Transfers	20	90	-292	222

Policy Indicators:
PP=-89; SP=-311; NPC=1.03; EPC=0.84; NPE=222; VAD=431; RCR=1.72.

6.2 Upper Middleveld

a) Maize Mixed (M1)
PAM

Level	Revenue	Costs		Profits
		Tradables	Domestic	
Private	542	287	395	-140
Social	524	207	536	-218
Transfers	17	80	-141	78

Policy Indicators:
PP=-140; SP=-218; NPC=1.03; EPC=0.80; NPE=78; VAD=318; RCR=1.69

6.3 Lower Middleveld

a) Maize Mixed (M0)
PAM

Level	Revenue	Costs		Profits
		Tradables	Domestic	
Private	243	61	225	-44
Social	235	57	410	-232
Transfers	8	4	-184	188

Policy Indicators:
PP=-44; SP=-232; NPC=-1.03; EPC=1.02; NPE=188; VAD=178; RCR=2.30

b) Maize Mixed (M1)
PAM

Level	Revenue	Costs		Profits
		Tradables	Domestic	
Private	839	216	251	372
Social	812	167	447	197
Transfers	27	48	-196	174

Policy Indicators:
PP=372; SP=197; NPC=1.03; EPC=0.97; NPE=174; VAD=644; RCR=0.69.

c) Maize Sole (M0)
PAM

Level	Revenue	Costs		Profits
		Tradables	Domestic	
Private	2827	326	395	2106
Social	2736	277	741	1719
Transfers	91	49	-346	388

Policy Indicators:
PP=2106; SP=1719; NPC=1.03; EPC=1.02; NPE=388; VAD=2459; RCR=0.30

d) Maize Sole (M1)
PAM

Level	Revenue	Costs		Profits
		Tradables	Domestic	
Private	1034	338	323	373
Social	1001	233	667	101
Transfers	33	105	-344	272

Policy Indicators:
PP=373; SP=101; NPC=1.03; EPC=0.91; NPE=272; VAD=767; RCR=0.87

e) Groundnut Sole (M0)
PAM

Level	Revenue	Costs		Profits
		Tradables	Domestic	
Private	2539	282	1210	1047
Social	2090	259	1562	269
Transfers	449	23	-352	778

Policy Indicators:
PP=1047; SP=269; NPC=1.21; EPC=1.23; NPE=778; VAD=1831; RCR=0.85

6.4 East Lowveld

a) Cotton Sole (M1)
PAM

Level	Revenue	Costs		Profits
		Tradables	Domestic	
Private	1356	348	455	553
Social	1708	264	463	980
Transfers	-352	84	-8	-428

Policy Indicators:
PP=553; SP=9801; NPC=0.79; EPC=0.70; NPE=-428; VAD=1444; RCR=0.32

b) Maize Mixed (M0)
PAM

Level	Revenue	Costs		Profits
		Tradables	Domestic	
Private	679	210	491	-22
Social	657	183	621	-147
Transfers	22	28	-131	125

Policy Indicators:
PP=-22; SP=-147; NPC=1.03; EPC=0.99; NPE=125; VAD=474; RCR=1.31.

c) Maize Sole (M0)
PAM

Level	Revenue	Costs		Profits
		Tradables	Domestic	
Private	896	201	637	59
Social	868	174	846	-153
Transfers	29	27	-209	211

Policy Indicators:
PP=59; SP=-153; NPC=1.03; EPC=1.00; NPE=211; VAD=694; RCR=1.22

d) Maize Sole (M1)
PAM

Level	Revenue	Costs		Profits
		Tradables	Domestic	
Private	299	274	185	-161
Social	290	180	446	-337
Transfers	10	94	-261	176

Policy Indicators:

PP=-161; SP=-337; NPC=1.03; EPC=0.23; NPE=176; VAD=109; RCR=4.08

6.5 West Lowveld

a) Cotton Sole (M1)
PAM

Level	Revenue	Costs		Profits
		Tradables	Domestic	
Private	2067	437	581	1050
Social	2475	343	724	1407
Transfers	-407	93	-143	-357

Policy Indicators:
PP=1050; SP=1407; NPC=0.84; EPC=0.77; NPE=-357; VAD=2131; RCR=0.34.

b) Maize Mixed (M0)
PAM

Level	Revenue	Costs		Profits
		Tradables	Domestic	
Private	355	71	375	-91
Social	343	65	575	-297
Transfers	11	6	-201	206

Policy Indicators:
PP=-91; SP=-297; NPC=1.03; EPC=1.02; NPE=206; VAD=278; RCR=2.07

c) Maize Mixed (M1)
PAM

Level	Revenue	Costs		Profits
		Tradables	Domestic	
Private	704	373	304	27
Social	681	279	595	-192
Transfers	23	95	-291	219

Policy Indicators:
PP=27; SP=-192; NPC=1.03; EPC=0.82; NPE=219; VAD=403; RCR=1.48

d) Maize Sole (M0)
PAM

Level	Revenue	Costs		Profits
		Tradables	Domestic	
Private	236	69	372	-204
Social	229	63	672	-507
Transfers	8	6	-301	303

Policy Indicators:
PP=-204; SP=-507; NPC=1.03; EPC=1.01; NPE=303; VAD=166; RCR=4.06

d) Maize Sole (M1)
PAM

Level	Revenue	Costs		Profits
		Tradables	Domestic	
Private	553	351	235	-32
Social	535	270	523	-257
Transfers	18	81	-288	225

Policy Indicators:
PP=-32; SP=-257; NPC=1.03; EPC=0.76; NPE=225; VAD=266; RCR=1.97

6.6 Lubombo range

a) Cotton Sole (M0)
PAM

Level	Revenue	Costs		Profits
		Tradables	Domestic	
Private	987	733	557	-304
Social	1181	662	679	-160
Transfers	-194	71	-122	-144

Policy Indicators:
PP=-304; SP=-160; NPC=0.84; EPC=0.49; NPE=-144; VAD=519; RCR=1.31.

b) Maize Mixed (M0)
PAM

Level	Revenue	Costs		Profits
		Tradables	Domestic	
Private	949	212	623	114
Social	919	181	822	-84
Transfers	31	31	-199	198

Policy Indicators:
PP=114; SP=-84; NPC=1.03; EPC=1.00; NPE=198; VAD=738; RCR=1.11

c) Maize Mixed (M1)
PAM

Level	Revenue	Costs		Profits
		Tradables	Domestic	
Private	1523	759	677	87
Social	1474	598	963	-87
Transfers	49	161	-286	174

Policy Indicators:
PP=87; SP=-87; NPC=1.03; EPC=0.87; NPE=174; VAD=876; RCR=1.10

d) Maize Sole (M0)
PAM

Level	Revenue	Costs		Profits
		Tradables	Domestic	
Private	591	238	402	-49
Social	572	206	701	-334
Transfers	19	32	-298	285

Policy Indicators:
PP=-49; SP=-334; NPC=1.03; EPC=0.96; NPE=285; VAD=366; RCR=1.91

e) Maize Sole (M1)
PAM

Level	Revenue	Costs		Profits
		Tradables	Domestic	
Private	1098	675	406	17
Social	1063	543	686	-167
Transfers	35	132	-280	184

Policy Indicators:
PP=17; SP=-167; NPC=1.03; EPC=0.81; NPE=184; VAD=519; RCR=1.32

Appendix 7. Results of the Domestic Resource Cost Analysis for the Crops Grown under the Individual Tenure Farm System in Swaziland, 1995/96

7.1 Maize

a) Highveld.
PAM

Level	Revenue	Costs		Profits
		Tradables	Domestic	
Private	965	903	303	-341
Social	710	666	430	-386
Transfers	155	237	-127	45

Policy Indicators:
PP=-341; SP=-386; NPC=1.22; EPC=-0.86; NPE=45; VAD=44; RCR=-9.75

b) Middleveld
PAM

Level	Revenue	Costs		Profits
		Tradables	Domestic	
Private	1075	896	258	-79
Social	1038	645	384	10
Transfers	36	251	-125	-89

Policy Indicators:
PP=-79; SP=10; NPC=1.03; EPC=0.46; NPE=-89; VAD=393; RCR=0.98

c) Lowveld
PAM

Level	Revenue	Costs		Profits
		Tradables	Domestic	
Private	847	887	251	-292
Social	818	657	379	-217
Transfers	29	230	-128	-74

Policy Indicators:
PP=-292; SP=-217; NPC=1.03; EPC=-0.25; NPE=-74; VAD=161; RCR=2.35

d) Average.
PAM

Level	Revenue	Costs		Profits
		Tradables	Domestic	
Private	938	895		
Social	855	656		
Transfers	82	239		

Policy Indicators:
PP=-228; SP=-198; NPC=1.10; EPC=0.21; NPE=-31; VAD=200; RCR=1.99

7.2 Cotton

PAM

Level	Revenue	Costs		Profits
		Tradables	Domestic	
Private	1415	868	445	101
Social	2740	676	578	1485
Transfers	-1324	192	-132	-1384

Policy Indicators:
PP=101; SP=1485; NPC=0.52; EPC=0.26; NPE=-1384; VAD=2063; RCR=0.28

7.3 Sugar Cane (Average)

PAM

Level	Revenue	Costs		Profits
		Tradables	Domestic	
Private	12879	3808	4079	4992
Social	15340	3018	3126	9196
Transfers	-2461	790	953	-4204

Policy Indicators:
PP=4992; SP=9196; NPC=0.84; EPC=0.74; NPE=-4204; VAD=12321; RCR=0.25

7.4 Pineapple

PAM

Level	Revenue	Costs		Profits
		Tradables	Domestic	
Private	8680	3711	2769	2200
Social	10663	3323	1985	5355
Transfers	-1982	388	784	-3155

Policy Indicators:
PP=2200; SP=5355; NPC=0.81; EPC=0.68; NPE=-3155; VAD=7339; RCR=0.27

7.5 Vegetables (Cabbage)

PAM

Level	Revenue	Costs		Profits
		Tradables	Domestic	
Private	17338	5878	4805	6655
Social	18933	5101	3285	10547
Transfers	-1595	778	1520	-3892

Policy Indicators:
PP=6655; SP=105471; NPC=0.92; EPC=0.83; NPE=-3892; VAD=13832; RCR=0.24

7.6 Citrus Fruits (Grapefruit)

PAM

Level	Revenue	Costs		Profits
		Tradables	Domestic	
Private	22303	5427	6700	10176
Social	24636	5057	5063	14517
Transfers	-2334	370	1637	-4341

Policy Indicators:
PP=10176; SP=14517; NPC=0.91; EPC=0.86; NPE=-4341; VAD=19580; RCR=0.26

7.7 Citrus Fruits (Oranges)

PAM

Level	Revenue	Costs		Profits
		Tradables	Domestic	
Private	24850	7238	7381	10231
Social	25854	6344	5171	14339
Transfers	-1003	894	2211	-4108

Policy Indicators:
PP=10231; SP=14339; NPC=0.96; EPC=0.90; NPE=-4108; VAD=19510; RCR=0.27

Appendix 8. Technical Coefficients and Yields with Improved Technology

8.1 Maize, on-farm trials

Item	HV	MU	ML	LV[††]	LR
Machinery (hrs/ha)[†]	12.05	12.33	10.02	10.44	10.95
Labor (hrs/ha)	374	386	287	331	332
Materials:					
Seeds (kg/ha)	20	20	20	20	20
Fertilizer-2:3:2 (kg/ha)	150	120	100	50	100
Fertilizer-Urea (kg/ha)	100	80	50	0	50
Insecticide-Thiodan (kg/ha)	15	15	15	15	15
Packing Material (no.)	48.29	52.71	29.57	36.29	38.57
Yield	3.38	3.69	2.07	2.54	2.70

[†] Including shelling and field transport.

[††] Figures apply to the whole Lowveld zone.

8.2 Maize, on-station trials

Item	HV	MU	MV
Machinery (hrs/ha)[†]	19.80	20.32	18.58
Labor (hrs/ha)	493	518	399
Materials:			
Seeds (kg/ha)	20	20	20
Fertilizer-Dolmatic Lime (kg/ha)	500	500	0
Fertilizer-Urea (kg/ha)	500	400	300
Insecticide-Thiodan (kg/ha)	15	15	15
Packing Material (no.)	72.00	75.72	49.71
Yield	5.04	5.30	3.48

[†] Including shelling and field transport.

8.3 Cotton (District Variety Trials) and groundnuts (On-station Trials)

Item	Cotton	Groundnuts
Machinery (hrs/ha)[†]	5.70	4.00
Labor (hrs/ha)	778	588
Materials:		
Seeds (kg/ha)	25	20
Fertilizer-2:3:2 (kg/ha)	100	200
Fertilizer-L.A.N. (kg/ha)	100	0
Herbicide-Cotogard (l/ha)	4.00	0
Herbicide-Dual (l/ha)	0.90	0
Insecticide (no. of sprays)	4.50	0
Packing Material (no.)	7.35	31.37
Yield	1.470	0.941